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Greetings.

Hearty Good Wishes

for a

Bright and Prosperous

1923.

CATTLE ON GINDIE STUD STOCK FARM

Department of Agriculture and Stock,
Brisbane.

We have pleasure in publishing the subjoined message to the Farmers of Queensland from the Minister for Agriculture and Stock, Hon. W. N. Gillies, on the advent of the New Year.

THE MINISTER'S MESSAGE

To the Farmers of Queensland.

Agriculture is the Mother of all Industry: leading all the Arts and Sciences, it is in the van of human civilisation and human progress. Present conditions call for a fresh, broad survey of rural life and its problems, a greater appreciation of the difficulties that beset Queensland's basic industry, and a more definite sense of direction in respect to its fullest development

The fostering of the Agricultural Industry, on which all our present prosperity is based and our future must be built, demands the attention of the best minds of the Commonwealth, and to this end the farmers themselves must contribute their quota of brains and energy

On the threshold of a new year it is good, perhaps, to pause awhile and survey our affairs in retrospect and prospect The past year is bright with legislative achievement Broad, liberal laws have given to the producers themselves the control of their own industry In the Primary Producers' Organisation Act and subsidiary measures the farmers have now the machinery for their own industrial emancipation

In the course of the year just closed the Provisional Council of Agriculture was constituted. Its chief purpose was to carry into accomplishment the great project of its progenitors of organising the farmers of Queensland into a completely unified, national, articulate, and forceful body In its preliminary work of organisation the Provisional Council has performed splendid service. In addition to setting up the machinery of central organisation, it has established 705 Local Producers' Associations, with an aggregate membership approaching 20,000 farmers. In the course of the next few months the Provisional Council will automatically cease to function. In its place will be established statutorily the standing Council of Agriculture elected by District Councils yet to be constituted, which in turn will be elected by members of Local Producers' Associations already functioning or about to be inaugurated The nominations for the District Councils are about to close. The franchise has been restricted to members of local associations, who must be bona-fide primary producers, and ballot-papers must be returned by February 3rd. Following the election of District Councillors will be the election from those bodies of representatives on the Central Council of Agriculture.

I cannot over emphasise the importance of members of local associations exercising the greatest care in selecting the best available men to represent them on District Councils and on the Grand Council.

The whole success of this great forward movement depends on the wise selection of councillors. It is hoped that the primary producers chosen will be men of breadth of mind, honesty, sincerity, ability, and abiding purpose, with, above all, absolute faith in the scheme upon which this great advance in rural organisation is based.

Looking forward, the coming year is big with promise that must surely ripen into fulfilment The field of rural organisation has been cleared and widened, the first furrow has been opened, the machinery is on the ground, and in their hands the farmers of Queensland now hold their own industrial destiny

W. N. Gillies

QUEENSLAND AGRICULTURAL JOURNAL

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FRUIT FLY INVESTIGATIONS.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) has made available the following Progress Report, No. 7, for the month of November, 1922, of the Entomologist stationed at Stanthorpe (Mr. Hubert Jarvis).

FRUIT FLY—POSSIBLE NATIVE SOURCE.

Visit to Vine Scrub.

On 1st November a second visit was made to the Vine Scrub, about 20 miles from Stanthorpe, and a search was made there for any native host-fruits of the Queensland fruit fly (*Chætodacus tryoni*); but no such fruits were, however, discovered here on this occasion, nor were any fruit flies seen.

One of the most remarkable features of the investigation was the great scarcity of all insect life in this scrub at this time of the year.

Native Fig.

A visit was also made early in the month to "Donneley's Castle," a rocky eminence about 8 miles from Stanthorpe, on the summit of which two or three specimens of a Native Fig-tree (species at present undetermined) are growing. Although at the time of my visit (in company with Mr. A. Hall, of The Summit, and to whom I am indebted for bringing these trees to my notice) the fruit of this fig-tree—both ripe and in a green state—was plentiful, no fruit fly maggots were found to be present.

LOCAL FRUIT FLY OCCURRENCE.

The following are the records of fruit fly occurrence within the Granite Belt during the month of November:—

On 17th November, 1922, fruit fly maggots, about half grown, were found in mid-season cherries, in the Bald Mountain District, and on the 21st additional specimens were secured—also from there. On 22nd November, fruit fly maggots, each about 4mm. long (hatched only a few days), were found at Applethorpe in two individual cherry plums.

On 24th November, four cherries were secured from the Stanthorpe area, about 2 miles from the town, harbouring fruit fly larvæ—about half grown.

On 28th November, 1922, fruit fly maggots, about 2 mm. in length, were found in Twenty Ounce apples at Bald Mountain, and about one dozen of them were collected showing fruit-fly punctures.

FRUIT FLY HABITS.

Oviposition of Fruit Fly.

It was found that, in the case of cherries, the fruit fly seldom laid more than three eggs in each individual puncture—usually two, but in some cases only one. In the Twenty Ounce apples, however, as many as eight eggs were noticed in one puncture, and seldom less than five eggs.

Number of Eggs in Captured Females of the Fruit Fly.

Twelve fruit flies captured in Twenty Ounce apples contained the following number of eggs respectively:—(1) 50, (2) 19, (3) 13, (4) none, (5) 46, (6) none, (7) none, (8) 36, (9) none, (10) none, (11) 2, (12) 44.

In one dozen fly-punctured apples of this variety, however, only four punctures were found to contain eggs. This seems to indicate the accidental disturbance of the fly, when preparing to oviposit; the sexually immature state of a certain percentage of female fruit flies at the time; or unsuitability in some particular for egg reception of the site chosen.

Development of Maggots.

Young fruit fly maggots, 1½ mm. in length, and apparently only hatched at most forty-eight hours, had, it was found, penetrated three-quarters of an inch into the apple tissue—almost to the centre. The development of the fruit fly maggot in hard unripe apples, must, however, be very slow. It is even, indeed, probable that many eggs laid in this fruit so conditioned either fail to hatch, or if hatching, the young maggots perish through inability to break down the hard fruit-tissue, and secure suitable nourishment.

Use of Lure (Experiments).

Glass fly traps baited with so-called Harvey Fruit Fly Lure (a small quantity of which was given me by Mr. A. Hall, senr., The Summit), have been set at Applethorpe, Eukey, and Bald Mountain, with the following results:—

Locality.	Date.	Time Set.	Variety of Tree.	Number of Fruit Flies Caught.
Applethorpe	28 Oct., 1922	10 a.m.—12 a.m.	Cherry ..	None
,, ..	30 Oct., 1922	4 p.m.— 5 p.m.	Cherry Plum..	None
,, ..	17 Nov., 1922	10 a.m.—12 noon	Cherry ..	None
,, ..	24 Nov., 1922	3·15 p.m.—4·30 p.m.	Cherry Plum..	One
,, ..	28 Nov., 1922	12·30 p.m.— 3 p.m.	Twenty-ounce Apple	One

The fruit flies trapped both proved to be female specimens of the Queensland fruit fly (*Chætodacus tryoni*).

Laboratory Observations.

Fruit flies have been kept alive in glass jars and fed with honey and water since 8th November, 1922, and although enclosed with various fruits (*i.e.*, cherry, peach, apple, and nectarine) have failed, so far, to oviposit, but no eggs were found in the individual females flies on these being examined. Experiments are being conducted to ascertain if the Solanum fly (*Chætodacus tryoni*, var. *solani*) will, in captivity, oviposit in cultivated fruit. Solanum flies hatched 6th November, 1922, from material sent by the Entomologist in Chief, 19th October, 1922, have been confined in glass jars with various cultivated fruits procurable, but have failed, so far, to oviposit in any such fruits, although crawling over same with every appearance of interest. The Solanum fruit fly appears to be much more difficudt to keep alive in captivity than its near relation *Chætodacus tryoni*, and it requires greater care in feeding it. Female Solanum flies examined for egg-development, kept in confinement one month after hatching from the pupæ, gave negative results.

CONTROL.

Control Measures.

The fruit flies now present in various localities in the Granite Belt are, I believe, numerically few, and the setting of suitable traps *now* with a reliable lure, if discoverable, should prove helpful in controlling their increase. It must be remembered that one female fruit fly can do a great deal of damage to the fruit on a single tree.

having (as has been ascertained) from 60-70 eggs to deposit, and porbably puncturing at least twenty individual fruits. Still more important than is the use of a lure is it to collect and destroy *all* fallen fruit, and to pick from the tree any fruit seen to be fly punctured, and destroy both. Leaving stung or punctured fruit on the tree is a practice fraught with much future danger, as many maggots develop and leave the fruit, while the latter is still on the tree, more especially so in the case of the stone fruits and the softer varieties of apple. Where the cleaning up is systematically and consistently practised now, early in the season, no serious loss of fruit will, I feel sure, be experienced from fruit fly damage. As I have repeatedly emphasised in former reports, "prevention is better than cure," and no chance should be given the pest to breed: even only one or two, plums or peaches, can cause a good deal of trouble, if maggot-infested and allowed to remain under the trees.

I quite realise that this care in the collecting and destruction of all infested fruit involves a good deal of time and trouble, but it is being practised by some of our most successful growers, having each a very large area under fruit, and if it can be done by one, it can and should be done by all.

Trapping.

Trapping the fly by means of lures will, of course, be a valuable help in controlling the pest, more especially *now;* but trapping will be of little service if once the fly gets a really good start. Trapping or luring alone will, in my opinion, never constitute a practical control of the fruit fly.

Local Interest.

Being aware, as I am, of the interest being taken in the control of this serious pest, and of the determination on the part of every orchardist to fight it successfully, I feel hopeful of the result this season, knowing that every individual will willingly do all that is in his power, not only in his own interest, but also in the wider interest of the whole district, the prosperity of which depends materially on the successful control of this fruit pest. A prolific source of fruit fly infection to local orchards are (under present conditions) the numerous fruit trees situated in various private gardens in the Stanthorpe town area. Although these trees are well known to our inspectors, it is a matter of much difficulty to keep a continual watch on such trees, at this time of the year, when they are working—so to speak—at high pressure.

Close Observation Necessary.

It is, therefore, incumbent on the owners or residents on any property on which such trees are growing, to see that the trees are carefully watched, and all fallen fruit gathered and effectively dealt with. In cases where these trees are of little or no value to the owners, they should be destroyed, particularly such early fruiting trees as cherries and cherry plums. Recently two large trees of this latter species were brought to my notice by Inspector Williams, who informed me that the fruit on both was badly infested with fruit fly maggots, and this I found to be the case. I cannot too strongly emphasise the danger of such trees—if fruiting and neglected—producing, as they would under such conditions, literally thousands of fruit flies to carry on the work of destruction to later fruits. Were this fact once realised by all who own, and are responsible for such trees, I feel sure that they would, in future, do everything in their power to obviate this danger.

OTHER INJURIOUS INSECTS.

Apple Beetle (Brown Phyparida).

This little chrysomelid plant-eating beetle is, in certain orchards, doing a considerable amount of damage to both the fruit and foliage of the apple. The beetle is just over a quarter of an inch in length, stoutly built, and of a shining brown colour. It is quick to take flight, and it is not easy to capture without a net. It is easily seen, and should be fairly easily controlled with the usual codling moth lead arsenate spray.

Cutworms and Caterpillars.

Throughout the month, cutworms and other caterpillars have been destructively busy among vegetables. Specimens of the latter received from the Broadwater district as damaging tomato plants, proved to be the larvæ of the well-known Noctuid pest (*Chloridea armigera*). This pest attacks a variety of cultivated plants. Probably an effective spraying with a reliable arsenical spray, early in the growth of the plant, and followed by similar spraying at about fortnightly intervals for a couple

of months or six weeks, will be found a fairly satisfactory method of dealing with this insect. A poison bran bait recommended by the United States Department of Agriculture for cutworms (*Agrotis* spp.) is as follows:—

Wheat bran, 50 lb.; Paris green or white arsenic, 1 lb. (or powdered arsenate of lead, 2 lb.); low-grade molasses, 2 gallons. Of course any quantity can be made, provided the correct proportions are observed.

The bran and arsenic are first mixed together dry, and the molasses is then added. Under dry conditions, salt, at the rate of 5 lb. to 50 lb. of bran will keep the bait moist and render it more effective. The addition also of six finely chopped lemons or oranges to the mixture has been found advantageous in coping with certain cutworm species.

FRUIT FLY—NORTHERN NEW SOUTH WALES.

Inspection.

Visits of inspection have been made to the following places during the month:—Bald Mountain, Broadwater, Ballandean, Beverley, Sugar Loaf District, The Summit, Applethorpe, Eukey. A visit was also made to the Liston, Amosfield, and Wylie's Creek Districts, in company with the New South Wales Fruit Inspector, J. Lindsay, in order to direct him to various places where abandoned orchards, visited by the Government Entomologist of New South Wales and myself in June-July last, existed. (A report, the outcome of this visit, dated 18th December, has already been summitted.—H.T., Entomologist.)

Fungus Diseases.

Several diseases of this nature have been referred to the Government Entomologist and Plant Pathologist, Mr. H. Tryon, whose reports on the same have been in due course received.

TOBACCO CULTURE—I.*

BY M. P. MARTIN, Chief Controller, Tobacco Industry, Madagascar.

Translated by MAJOR A. J. BOYD.

The latest "Bulletin Economique," published by direction of the Governor-General of Madagascar, contains a very informative article on Tobacco Culture in Madagascar and on the East Coast of Africa. Methods of cultivation and after treatment of the tobacco crop, which will interest Queensland growers, are exhaustively set out, and from this article the following interesting notes have been abstracted.—Ed.

CLASSIFICATION OF TOBACCO.

A. Heavy Tobaccos.
B. Light Tobaccos.

Heavy Tobaccos.

Heavy tobaccos are defined as tobaccos highly charged with nicotine. These can only be used in the manufacture of snuffs and in the shape of twist for chewing. In point of fact the requirements of the manufacturers are restrictive and show a tendency to become less still, as the habits of snuff-taking and tobacco-chewing are falling into disuetude in every country. Hence, the production of heavy tobaccos is not desirable. The varieties producing them should, therefore, no longer be cultivated, except, perhaps, in localities where the cultivation of light tobaccos is not possible, either on account of the azotic contents of the soil, which tends to increase, notwithstanding all the nicotine contained in the leaves, or else because the presence of chlorides renders these tobaccos completely incombustible.

Light Tobaccos.

These may be subdivided into three principal categories:—

1. *Cigar Wrappers.*—Tobacco for wrappers, that is, an external covering for cigars. The leaves intended for this purpose should present a fine resistant tissue, nerve veins scarcely perceptible, very far apart, and exhibiting a very obtuse angle

**Bulletin Economique de Madagascar.* La culture du Tabac a Madagascar (Extraits du rapport de M. le contrôleur principal Martin, des manufactures de l'Etat en mission à Madagascar).

with the centre vein. The colour must be uniform and pleasing to the eye, and the combustiblity perfect. The cultivation of this class, however, is not advisable; in fact, it would be better to advise the withdrawal of plants capable of being utilised as wrappers, as all the advantage which might be expected from them is nullified by the amount of hand labour it entails; and hand labour is expensive and almost unattainable in Madagascar, as well as in other tropical countries, such as Queensland. Failing sufficient care or suitable labour during the process of drying or in gathering the leaves, or delivery and storage, the expected returns would be far from being realised.

Small experiments should be made, which would give precious information, but stress is laid upon this:—That one should avoid, for the present at least, attempting to produce, at all events on a large scale, leaves intended for the wrapping of cigars. Once having been refused by buyers as cigar wrappers for some reason or other, such leaves would only be accepted as scraps, and the cash return would be as much less according as the leaves are of less weight.

2. *Aromatic Tobacco.*—In this category is included such tobaccos as present a well-developed and agreeable aroma, such as originated in Maryland or in the East. These tobaccos evidently command a high price, but only under the express condition that they retain the desired aroma. Seed, direct from a plantation situated in a high position, should yield from a first planting at the least plants similar in appearance to those of their parent plants, but from which the necessary qualities will have disappeared more or less entirely. The aroma, to which certain classes of tobacco owe their high price, is the result of certain things as yet uncertain. It is due to the soil and to the climate, and in all points may be compared to the bouquet of good wines. Everyone knows how, in France, the crops are catalogued and show the individual qualities which it has been found impossible ever to reproduce elsewhere. Can it be admitted the cultivation in Madagascar of the vintages of Bordeaux or Burgundy would be capable of producing such incomparable wines, or those which had been produced in their native home? It is exactly the same in the production of aromatic tobacco, and the production of the original seed with another well-authenticated seed is not a guarantee of quality. Several small experiments made in different parts of the island gave rise to a hope that well-defined localities will be in a position to produce tobaccos with a fine delicate aroma, but these must be increased before any certainty can be arrived at.

3. *Ordinary Mixed Tobacco.*—The requisite qualities of the tobaccos of this group are more restricted. To be exportable, it is sufficient that they be well cured, fairly combustible, and not possessing any disagreeable taste. According to the qualities of each lot, so will the sale price vary.

SOWING THE SEED.

A cubic centimetre of seeds weighs ½ gramme, which means 7,000 to 8,000 seeds, which is more than are required for sowing a square metre. A sewing thimble makes a good measure, and will hold sufficient seed to sow from 2 to 3 square metres of land. Too thick sowing necessitates thinning out the plants in the seed bed, which is injurious to those left to grow for planting out. When they are too crowded in the seed bed, the stems of the young plants become very thin, and the leaves are narrow and tapering, and this malformation continues after they have been planted out in their permanent positions. Furthermore, the rootlets become a tangled mass, with the result that after transplanting recovery is slow and difficult, so many young fibrous rootlets being violently broken. Too close planting will necessitate fresh planting out, and, so to speak, wet-nursing them. All this necessitates extra labour for a long period, which might have been avoided by greater care when sowing the seed.

Now, when the seed bed has been carefully and lightly sown, the young plants develop normally, they become thick in the stem, short and equal in size, and the leaves are larger. The seedlings sown with due care can be withdrawn from the bed without injuring the roots, and may be transplanted with every chance of their thriving rapidly.

To obtain on a widely-sown seed bed a uniform distance between the seeds, this can be done easily, notwithstanding the minute size of the seeds, by mixing with the latter 20 to 30 times their volume of fine charcoal cinders (ashes). Sow gently broad cast, and when there is no wind. The seed and cinders fall together to the ground, and the grey colour of the ashes enables the sower to regulate the fall of the seed. The latter, owing to their minuteness, should not be deeply sown. The best plan is to cover them with a bed of very fine earth, scattered uniformly, using for this purpose some kind of sieve. Then use a light plank laid on the bed, the

slight pressure of which causes the adhesion of the seeds to the soil, which latter should be constantly kept moist, but not too wet. All that remains to be done is to shade the bed by means of screens or bushes from the direct rays of the sun, and finally to keep down the weeds by frequent hand-weeding.

CHOICE AND PREPARATION OF THE LAND.

Although tobacco will grow on all kinds of soil, it should, in order to obtain good results, only be cultivated on soils of high fertility, which are not too moist. As a general rule, it may be admitted that heavy soils produce a coarse plant rich in nicotine, and that light soils produce a finer quality of leaf containing less alkaloids, and, consequently, of greater commercial value. A soil very rich in azote (nitrogen) increases the percentage of nicotine in the leaves, destroys their colour, and increases the difficulty of their desiccation and conservation by increasing hygrometric power. A soil rich in azote results in fine, well-coloured, very combustible, and easily prepared leaves, owing to their being less sensitive to variations of the atmosphere. Soils full of chlorides, frequently met with near the sea-coast or at the mouths of rivers, are not suitable for the cultivation of smoking tobacco, the product derived from such soils being absolutely incombustible.

In Madagascar, the difficulty of obtaining manures does not enable the grower to modify, as he would desire, the chemical composition of the soil. On the other hand, in all the districts in which the cultivation of tobacco can be advised, azote exists in sufficient quantity; indeed, it is usually found in too large a percentage. Beyond farm-yard manures, the only element to be recommended for use is potash free from chlorides, in the form of sulphate or carbonate, to the absolute exclusion of chlorides, which would destroy combustibility; hence, the ideal potassic manure is, as stated, the sulphate of potash free from chlorides.

Unfortunately, the price of potash manures is too high at present, but a substitute may be used to almost equal advantage in the shape of the ashes from many indigenous plants, which contain from 12 to 16 per cent. of potash, which should be freely scattered over the land before ploughing, with excellent results at once. With deep cultivation, the land so treated will yield infinitely greater returns than those which have only been, so to speak, scratched on the surface.

TRANSPLANTING.

As soon as the young plants in the seed beds have sufficiently developed—that is to say, when they have obtained a height of 5 or 6 inches—they will be ready for transplanting. Previously to this, the seed bed should be copiously irrigated and the water allowed to sink into the ground to facilitate the withdrawal of the seedling plants, an operation which must be carefully done in order to avoid injury to the rootlets.

The planting out must be quickly carried out, taking time, however, to select the strongest plants and as many as possible of equal size. All those which appear drawn up and slim, all spotted ones, or of pale colour, those whose root system is badly developed must be ruthlessly rejected. Plants well rooted, thick and short, with large leaves spreading over the soil and having a beautiful, uniform, deep-green colour should be the only ones transplanted, because these alone are capable of good development in the field.

The planting in their permanent places in the field is done with a planting stick or trowel, in cloudy weather if possible, or else, in the evening, and every precaution should be taken that the roots be not turned upwards or planted in a ball, and gentle pressure must be applied to ensure their adherence to the soil up to the crown. If improperly planted, the plant grows badly, becomes emaciated, and will be of little value. On the other hand, if the heart is embedded, the plant quickly dies. Watering is unnecessary, except when the soil is actually dry; in this case a single glass of water per plant is enough to ensure its striking; but directly after this watering, a slight covering of soil well crumbled should be shaken over the watered soil in order to prevent too rapid drying, which would harden the watered part and enclose the young roots in a block of compact soil highly prejudicial to the eventual development of the plant. Nothing further now remains to be done beyond providing some protection from the direct rays of the sun.

(TO BE CONCLUDED.)

SUGAR: FIELD REPORTS.

The Southern Field Assistant, Mr. J. C. Murray, Bureau of Sugar Experiment Stations, reports under date, 13th December, 1922, as follows:—

In the course of the month of November cane areas around Bundaberg, Gin Gin, and Childers were visited.

Woongarra.

On this section of the Bundaberg sugar areas there is every chance, provided normal rains occur within the next six weeks, of a good crop. In the face of unusually dry weather during the past six months, the young plant and ratoon crop look very healthy, and, as the weather seems now very broken, a severe setback is improbable.

As previously pointed out, in reports on this district, the extraordinary hardiness and drought resistance of the young cane this year is probably due to better and deeper tillage. Growers are recommended to persist in this, especially in its relation to surface cultivation, so that the capillary soil tubes may be kept broken and moisture prevented from escaping.

Canes still making a good showing are Shahjahanpur No. 10, Q.813, H.Q.285, and 1900 Seedling. The first-named is rapidly coming into favour. This variety is 70 per cent. frost resistant, is of good sugar content, strikes, grows, and ratoons well. It is not heavy in the stick, but the number of canes to the stool make up for any deficiencies in this respect.

H.Q.285 is a variety that is going to give the farmers good returns if well selected and cultivated. It has shown no great resistance to frost, but is a good general cane, with early-maturing properties. The farmers are justified in planting this cane with any of the mid-season maturing varieties. The other canes mentioned above are well known varieties and both suitable for extensive planting on moderately good soils.

Barolin.

This area is also showing extensive fields of green cane, and prospects look brighter for a big crop than for a number of years. Very few suggestions could be made to improve cultivation. A tendency to cultivate young plant cane with implements that are inclined to propel a little too much earth on to the plants is observable.

Growers are getting good growth from the Shahjahanpur No. 10, 1900 Seedlings, Q.813, M.189, Q.970, Q.1121, and Q.1098. The three first-named are giving the best results; some very fine fields of all three varieties having been seen. The first named appears to be coming much into favour, especially on any land that is frosted or not particularly rich in plant foods.

Except for slight frost check in the winter time, the Barolin farmers should in the future make good progress. Most of the farms are easy to cultivate and drain, and present no complexity regarding feeding the soil, at least as far as can be observed by local results. Cowpea, Mauritius bean, and maize have given positive results as green manures; products of meatworks have also given payable results to the farmer. It is probable in applying lime to these soils that light applications of burnt lime with each ploughing would be better than a heavy application after each half dozen years. On this forest loam it is practically certain, from present observations, that lime would be beneficial, especially before ploughing in a crop of green maize, or in fact any green manure.

At present there is a large quantity of animal manure lying about the paddocks adjoining dairy farms. Canegrowers are reminded that this manure is good material, and the grower that avails himself of it will be amply rewarded for a little extra work involved.

Sharon.

The cane here looks well, and the growers have no need to fear a dry spell. However, the necessity to cultivate exists strongly. There is still a great deal of land in the Sharon district that would grow cane, but owing to the present unsettled state of the industry the farmers are doubtful about further development.

Gumming is in evidence in D.1135. Control of this disease has been referred to in previous reports. The most important measure is careful selection of plants, discarding of tolerant or susceptible varieties (D.1135 could be classed as tolerant), and the fallowing of land whereon the disease has been found for a period of twelve months. Farmers here are advised to give Shahjahanpur No. 10 a more extensive trial than they so far have done. Growers are also advised to experiment with sulphate of ammonia and nitrate of soda, with a view to determining their value as fertilisers calculated to force along backward ratoons.

Gin Gin.

At the time of visiting Gin Gin the country was dry, but, nevertheless, the cane looked healthy. The farms are very well tilled, and the prospects of a good crop next year are good. Grubs are doing a certain amount of damage on some farms, although the mischief done is not sufficient to cause any concern. Growers are reminded that by constant cultivation the grub is harassed and, to a certain extent, destroyed.

Good results during the past season have been obtained from M.1900 Seedling, D.1135, H.Q.426, H.Q.285, and Q.813. During future planting operations in this district it will be necessary to be most careful in plant selection, especially with D.1135, and farmers should take the opportunity of changing plants from an alluvial or granitic to a volcanic soil. Changing plants invigorates the variety and maintains it true to good type, at least it greatly helps the useful work done by careful plant selection.

Childers.

Childers presents a picture like a sea of rippling green. The great bulk of the crop next year will be ratoon, as not much planting has been done this season; there will also be a small acreage of standover.

Farmers are realising the necessity for disturbing the soil deeply, if they are to combat, in a measure, the dry season, and are strengthening their teams and adjusting their implements accordingly.

Varieties making a good showing here just at present are M.1900, Q.813, Q.1098, H.Q.285, and D.1135. The latter variety is showing a considerable amount of gum, and it would be wise if growers who are affected could spell these areas for a number of months, and reintroduce cane of the same variety, say, from the Maroochy River, where a fairly healthy set of conditions prevail.

Disease is appearing in other varieties, but there is no indication of anything that need cause misgivings. Small areas of Shahjahanpur No. 10 are in existence. This is a cane that should be more extensively planted, as it has many qualities that should recommend it to a man on low-lying ground. An idea appears to be abroad that this cane is diseased. This is entirely erroneous; the fact that it was issued by the Bundaberg Sugar Experiment Station should be sufficient proof that the cane is healthy.

Most of the growers in this district contemplate fertilising extensively in the future. As previously reminded, they should make full use of the facilities provided by the Bureau for soil analysis. Growers at present are not getting anything approaching adequate returns for the money they expend in fertilising, mainly on account of no methodical preliminary work. It is an error to be too conservative in these matters.

The Northern Field Assistant, Bureau of Sugar Experiment Stations (Mr. E. H. Osborn), reports under date, 1st December, 1922, as follows:—

Mossman District.

Generally speaking, the condition of the crops compared very favourably with any seen further South.

Up to the end of October 73.43 ins. of rain had fallen—

	Inches.
January	9.25
February	23.54
March	23.08
April	6.13
May	4.25
June	1.58
July	2.34
August	.85
September	.45
October	1.96
	73.43

Ratoons look remarkably well, and better than most ratoons seen elsewhere.

The crushing, although resulting in a lighter tonnage than previously expected, was very satisfactory. No labour troubles of any kind had caused delay to the successful working of the mill.

In previous notes mention was made that the principal canes grown in the area are:—D.1135, Black Innis, H.Q.426, Badila, B.147, and the Gorus (24A, 24, and 24B), with M.Q.1 (Mowbray Seedling). In several cases the last-named has given good results this season, both as regards tonnage per acre and also as to c.c.s. values. Mr. Arthur Rex considers that a few acres he grew on a fairly rich flat gave him a return of 35 tons to the acre, and his density returns were also very fair. After cutting the ratoons this cane grew very vigorously. This grower, after having had soil analysis made, has limed and sown with beans an area to plant later on, and compare results with other blocks not so treated.

Messrs. Crees Brothers have gone to a lot of trouble to keep their nursery up to date. They now have a very good strike of Gingor, Obo Badila, H.146, H.109, E.K.1, E.K.28, H.Q.458, Oramboo, and Nanemo. These planters deserve commendation for the care that they are always ready to give to any canes likely to be of benefit to their particular district. They are also growing a very fair quantity of B.147 upon the farm. This cane is rather a favourite in the Mossman district, as it is claimed that at thirteen months old it often gives a 30-ton to the acre crop, has a good average density, and also is a good striker. D.1135 still continues to give good results at the Mossman. Mr. J. Clarke cut a thirteen-months' old crop of 6th ratoons going 15 tons to the acre and a c.c.s. of 16.2. Badila grown alongside gave about the same tonnage per acre, but its density was only 16.0. On Mr. R. Rex's farm nearby, but upon high land (manured), a crop of 1st ratoons of this variety gave as high as 38 tons to the acre, and carried a density of 15 c.c.s. Q.813 has not so far been grown to a large extent, but an increased area has been planted out for next year. Pringle Brothers' returns from this cane are, however, worth noting, for a thirteen-months' old crop of 1st ratoons went 20 tons to the acre. The average c.c.s. of six samples of this was 15.61, against the average mill sample for the same days of about 14.5 c.c.s.

Bowen District.

The rainfall record up to 23rd November was only 24.29 inches—

	Inches.
January	5.12
February	12.94
March	2.41
April	.13
May	.11
June	.50
July	2.40
August	—
September	.25
October	.18
November (to 23rd November, 1922)	.25
	24.29

Naturally, with such a very poor fall, the cane areas (except where irrigated) looked at their worst. Luckily most of the farmers have small plots, and where these have been used the cane looks very promising. A certain amount of planting was also taking place, but in nearly all cases the land had been watered prior to planting. Also in most cases the plants had been "soaked" for a day or so.

A feature of the district was the number of new wells that have and are being sunk, and also the number of pumping plants that have been installed recently.

Mr. Burrell has a couple of wells in use, and has just ordered a tractor for cultivation work and also to pump with.

A demonstration given for pumping purposes caused him to decide upon getting a similar tractor.

Mr. J. Maltby uses a portable engine for pumping upon his farm, and claims and shows very good results from its use. This planter has had a very good strike with a number of canes lately obtained from the experimental plot upon the Home Hill State Farm. After liming with about ¾ of a ton of earth lime to the acre, watering the drills, and using about 5 cwt. meatworks manure per acre, he planted the following:—M.Q.1 (Mowbray Seedling), Tableland Badila, B.208, Hybrid No. 1, M.1900, Q.855, and E.K.28. So far, the growth is vigorous.

It is very interesting to note that many more farmers than formerly are now using manures in this area.

CALIFORNIAN METHODS OF POULTRY RAISING AND MARKETING—I.*

In view of the widespread revival of interest in the poultry industry the subjoined article reprinted from the Journal of the Ministry of Agriculture, United Kingdom, and compiled from a Consular Report, will be regarded as of exceptional relevancy.—Ed.

It is a commonplace that the conditions under which many American industries have grown up have produced organisations different in many respects from those of Europe. The difference in conditions, however, has not been so great as to preclude the adoption in Europe of American methods, where these are found to be of value. Advantage has, in fact, so frequently been taken of American experience that it is the more remarkable that poultry-farming organisation in that country has hitherto been so little reflected in British methods.

That poultry-farming practice in the United States is worthy of investigation is shown by the following salient facts:—That 22,000,000 dozen eggs and 240,000 dozen poultry were shipped in 1920 from a district in California some 50 square miles in extent; that a farm of 2,500 hens is considered to be one man's work; and that an annual net profit of 1 dollar ten cents (normally 4s. 7d.) per hen is considered a somewhat low average.

It is true that the soil and climate of California are contributory causes of these arresting results, but they are by no means so important as is frequently held. The settlement which it is proposed to describe is only one of several in California, and the methods of all of them are common to most poultry-farming centres in America, even to those in the Eastern States, where the climate is less suitable than in England. Further, the methods and devices described below must not be regarded as the chief cause of prosperity; they are themselves the outcome of a business prosperity founded on three main principles—hard work, cleanliness, and attention to detail. There are no illusions in such communities regarding the exacting nature of the work necessary for success in poultry farming, and unremitting attention is everywhere evident. The importance of cleanliness and adequate disinfection is also recognised. Dirt and disease are destructive of the results of so much labour that it has become an imperative business principle to avoid them. A continual application of these three principles has been a prime factor in creating the organisation which it is proposed shortly to outline.

This organisation has its centre at Petaluma, a town of some 6,000 inhabitants, situated near the northern extremity of San Francisco Bay. It is the headquarters of the small district which, as already stated, produced over 22,000,000 dozen eggs in 1920, and, although apparently the largest poultry-raising community in the world, may be taken as typical of many similar centres throughout the United States.

Poultry Hatcheries.

The poultry-raiser of Petaluma usually obtains his stock from one of the "Hatcheries" of which there are several in the town. One of these, which may be taken as typical, hatched out 1,000,000 chicks in 1921. The eggs are bought at about 10 cents above current prices by the hatchery, which is a business concern, and in no sense co-operative. The resultant chicks are sold at about three times the price of the original eggs. Eggs for hatching are bought from specially selected ranches known to the hatchery as possessors of highly productive strains; in some cases the hatcheries themselves supply cockerels, and are thus in very close touch with the pedigrees of the birds whose eggs they hatch. The incubators are arranged in tiers on racks in a large room and are heated by gas or electric appliances regulated by thermostats, of which there is one in each chamber. The air is kept comparatively moist by leaving the ground beneath the racks exposed, only the alleyways between being paved. This is scarcely sufficient for the upper ranges of incubators, and where necessary further moistening is provided by means of pans in the incubators. The eggs are turned by hand, the trays being grooved to make this task easy. The owners of the hatchery in question prefer this method to mechanical turning, as their experience shows that the mechanical method is productive of a considerable percentage of abnormal chicks. By the hand-turning method, combined, of course, with careful tending throughout the hatching period an average hatch of 80 good chicks in every 100 is obtained.

When the newly-hatched chicks have been dried off they are placed in ventilated boxes containing four sections of twenty-five chicks each for delivery. Frequently of course, local poultry farmers arrange to receive back the chicks hatched from eggs

* From a report drawn up by H.M. Acting Vice-Consul at San Francisco and communicated through the Department of Overseas Trade, U.K.

supplied by themselves, but large numbers of day-old chicks are sent considerable distances to the hatchery's customers. It is found possible to send day-old chicks on a seventy-two-hour journey without injury or prejudice to their subsequent growth.

An interesting feature of the organisation of the hatchery under notice is that one of the partners, who is a qualified veterinarian, is placed at the disposal of all purchasers of day-old chicks who live within a reasonable distance. If any trouble arises or if any advice is needed his services are invoked. This procedure is of great value to the hatchery, both for purposes of advertisement and because it ensures a larger percentage of survivals than would otherwise be the case. The veterinarian further justifies his existence by superintending a model poultry farm owned by the hatchery.

Brooding.

A great deal of attention is naturally given to the brooding of young chicks, and numerous types of houses and machines are in use. One of the favourite methods is by the use of what is known as the "Kresky" house. This consists of two rooms, one of which is kept heated at 75 degrees F. by means of an oil stove and thermostat, the second being considerably cooler. A small entrance is provided from the warm to the cool room, and from the latter to the chicken-run, so that the chicks may accustom themselves to the different temperatures. The room floors are usually covered with some form of warm, dry litter, and the corners are rounded off to prevent suffocation of chicks by crowding into corners.

Trays of grit are placed in both rooms, and frequently a continuous water supply and food supply is provided.

This form of house appears very useful for large numbers of chicks. The owner of a "ranch" in Petaluma recently raised 6,000 chicks in four Kresby houses each room of which could not have been more than 20 ft. by 16 ft. Including the open-air "run," these 6,000 chicks were raised in an area of less than half an acre; and, although their owner, having neglected to separate his cockerels at the earliest possible moment, was, in this case, risking loss by overcrowding, there is no doubt that chicks are brooded successfully in very confined areas. One square foot for young chicks and two square feet for hens and pullets is the room considered desirable here.

Various forms of smaller artificial brooders are in use. The majority of these are heated by oil or coal stoves. This method has the advantage of needing only one house instead of two, as with the Kresky method. An electric brooder of orthodox design was also seen, the heat being supplied by wire coils beneath the floor of the brooder. In all cases regulation is provided by a thermostat which, in the case of the electric brooder, showed a small light when current was being used.

The size of the flocks of young chicks placed in the brooders is a feature of Petaluma. The batches vary from 500 to 6,000, 2,000 being a frequent quantity. The cockerels are separated at the earliest possible moment. Success is only due to detailed personal attention to such matters as feeding, ventilation, control of light, and care that the chickens do not damage each other by toe-picking, overcrowding, and so on.

Houses.

The Chamber of Commerce of Petaluma encourages the use of trap-nests and modern hen-houses by means of egg-laying contests and kindred activities, while, as will be shown later, the methods of the co-operative egg-marketing association make it to the interest of the poultry farmer to use the most scientific methods possible. Many of the Petaluma ranches still retain the "colony" type of hen-house with a common run for several houses, but these are being supplanted, whenever possible, by more modern types of houses. The scheme now being adopted is to provide a house accommodating some 3,000 hens, the house being divided into sections each holding about 250 birds. A separate run is provided for each section, and where possible, a double run system is used, the runs either being arranged on both sides of the house or divided longitudinally on one side only.

Trap-nest systems appear generally to be confined to ranches producing eggs for hatching, and the majority of the farmers rely on their experience in judging the qualities of a hen, combined with the system known as "Hoganising" (*i.e.*, the handling test).

The houses of the poultry farm owned by the hatchery described below may be taken as typical of the principle upon which Petaluma farmers work, though in practice possibly not many of the ranches are so scientifically organised throughout.

The houses on this ranch, some 50 ft. long by 20 ft. wide, are built to accommodate 500 hens. They are lighted by muslin-covered windows and by electric light. The roosting perches run lengthways, are movable, and on one level. They are wide enough for the hen to perch without grasping with the feet, as this form of perch

is considered to be less tiring for the hen, and hence to contribute something towards its egg-laying capacity. Beneath the roost is a dropping board, some 3 ft. 6 in. from the ground and 12 in. below the perches. These arrangements leave the whole of one side and one end of the house for trap-nests, which are placed at a height of about 4 ft. from the ground, to make egg-collecting easy.

One trap-nest for every three hens is found to be sufficient, eggs being collected every hour, and credited to the record of the hen. A bucket is suspended by a wire moving in front of the nests, so that no stooping or unnecessary labour is entailed. In so exacting a business as poultry farming on this scale, such labour-saving devices are invaluable. Clean dry litter is kept on the floor and covered-in water-troughs are provided at a height of 18 in. to 2 ft. from the ground to prevent litter being scraped into the water. Feed mixtures are placed in a dry-mash hopper. It appears that the advocates of dry and wet mashes are fairly equally divided, though probably slightly more dry mash is fed on account of the saving in labour as compared with the wet mash, a dry hopper needing to be filled only once or twice per week. Where wet mashes are used they are mixed with green food to avoid wastage. Many successful farmers pay great attention to the supply of green food, care being taken to provide different varieties.

The problem of the fouling of land in Petaluma Valley is a comparatively easy one. The soil is almost everywhere a light, sandy loam, porous, and productive; the climate is mild and equable; and, the district being well provided with small hills, natural drainage is almost universal. Under these conditions the double-yard system can be used to the greatest advantage. A foul yard is ploughed up, limed, rested for a few days, and then sown with quick-sprouting seed. At the end of three weeks there is usually a growth some 6 or 7 in. high, and the hens can be turned on to this. It is thus possible to confine the birds to an area which they will completely foul in three or four weeks, and by carrying out the process described above, to keep a large flock of poultry on a very small tract of ground.

The Feeding Problem.

The dimensions of the poultry-farming industry here have resulted in simplifying the feeding problem also. There are several grain merchants established in the town who import their grain from the neighbouring Sacramento and San Joaquin Valleys by cheap water transport. They mix their feeds in Petaluma itself and by establishing carefully composed brands of uniformly good quality, have materially reduced the poultry-farmers' cares while ensuring a constant market for their goods. Most of the grain and meal seen in the repositories was of good quality and remarkably clean. It is a noteworthy result of the magnitude and intensiveness of the Californian agricultural industries—in fruit-growing and dairying as well as in poultry farming—that great importance is attached to the grading and branding of the various products. The producers themselves are so well aware of the commercial value of a good reputation for their goods that they go to considerable trouble to keep their brand uniform in quality, and are the more ready to place confidence in the branded grades of producers of other articles.

The buyer of poultry foods in Petaluma is, therefore, almost always willing to trust to a known mixture and rarely finds his trust misplaced. He is able, in consequence, to free himself from the necessity of growing or mixing grain himself.

Culling.

Another point upon which stress is laid is the elimination of the unfit or "culling." Unfit or unpromising chicks and bad layers are weeded out constantly on the principle that food is lost if given to an unworthy bird. The average bird is expected to lay 120 eggs in a year, and if she falls below this standard by the trap-nest or other record, she is sacrificed without compunction.

Co-operative Sale of Eggs.

It is after the collection of the eggs that the poultry farmer comes within the sphere of influence of the co-operative society known as the Poultry Producers of Central California Incorporated. Some 75 per cent. of the Petaluma farmers belong to this organisation, which concerns itself with the marketing of the eggs. The farmer is expected to clean the eggs if necessary with a wad of steel wool (this having been found to be by far the most effective and least injurious method) and to grade them according to their size, colour, and degrees of dirtiness. He buys egg-boxes holding thirty dozen from the co-operative society, and delivers them himself, when packed, at the society's depôt. The society's organisation makes it capable of obtaining the best and most stable price possible for eggs the receipts being credited to the farmer according to the quantity of eggs which he has delivered.

[TO BE CONCLUDED.]

PEACH CULTURE.

By J. M. WARD, Senior Instructor in Fruit Culture.

PROPAGATION.

The peach is generally grown from pits (seeds) and the variety required budded on to the seedling in January. In selecting pits, preference should be given to those from strong-growing peaches. Sometimes the hard shelled sweet almond is used as a stock; this is not generally satisfactory, except in a dry soil, the almond standing a dry situation better than the peach. When it is intended to plant on a wet soil the plum stock is used, as it will stand a more moist situation than will the peach roots. In this case the St. Julian or Myrabolan plum should be used, the former being the better of the two. Generally speaking, peaches are best worked on their own roots by budding on to the seedling; grafting is very unsatisfactory.

SOILS.

The range of soils for the peach can be somewhat extended by the choice of stock for budding upon. The best peach soils are light, deep sandy loams, more dry than most, good drainage being essential. They will thrive on land with a mixture of coarse sand and gravel, providing it contains the needed elements of fertility. For rapid growth and heavy fruiting the peach requires abundant nutriment. Therefore, where the land is of a poor nature it must be enriched by thorough manuring.

DISEASES AND REMEDIES.

The diseases that attack the peach tree are numerous: it is attacked by several forms of fungus, the most troublesome of these being curl-leaf (*Exoascus deformans*). It is also attacked by the black aphis (*Myzus cerasi*) and by the green aphis (*aphis persicæ*). For curl-leaf and other fungoids the tree should be sprayed with the Bordeaux, Burgundy, or lime-sulphur mixture just before the buds burst (about the beginning of August (using the 4.4.40 formula; spray again after the fruit has set at half strength of this mixture.

The aphis infests every part of the tree—roots, branch shoots, leaves, and young fruit—in incredible numbers, and as the whole of their nourishment is obtained by piercing the bark or leaf, inserting the beak or rostrum and sucking up the juices, it may readily be seen how very exhausting to the tree a severe attack must be. For destroying the root form of aphis, during the winter months, remove the soil a little for a few feet around the trunk of the tree, and sprinkle over the roots a few handfuls of sulphur, or pour over the roots 3 or 4 gallons of sulphate of copper (bluestone) mixture, using ½ oz. of bluestone to 1 gallon of water. If tobacco dust or leaves are procurable it can be used instead of the above; sprinkle and dig it in around the tree. To destroy the aphis on the upper portion of the limbs thoroughly spray every part with McDougall's insecticide, kerosene emulsion, or tobacco wash, such as Black Leaf 40. Continual spraying at frequent intervals is necessary, as the insect continues coming in countless numbers. It is necessary to spray with the Bordeaux or Burgundy mixture, or lime-sulphur, every spring, even if the curl-leaf does not make its appearance for one season. By continual spraying with a fungicide the tree is kept in a healthy condition, good fruit resulting.

PRUNING.

After spraying to keep fungoids down, the pruning of the peach is the most important matter to the grower. If the tree is not kept healthy pruning is useless, for the peach must be in a robust condition to make the pruning a success.

The pruning of the peach is, like that of the plum, greatly misunderstood by the majority of fruitgrowers, resulting in small crops of fruit being picked from the tree, and what few fruit there are are mostly gathered from the top of the tree or the ends of the branches, most of the wood being almost destitute of leaves and fruiting laterals. The fruit of the peach tree only comes on one-year-old wood; occasionally some varieties fruit on spurs, but this only rarely takes place. One must rely only on one-year-old laterals for his crop, otherwise he will be sadly disappointed. It is the common practice among those who have not studied the habits of the peach to let it grow entirely unpruned; this results in heavy crops while there is young wood in the tree. The new growth will fruit, then become barren, the peaches again appearing on the new wood that has extended from the place

where the fruit was previously gathered. Each year the new growth is weaker and shorter, and gradually the lower portion of the tree becomes devoid of fruit and is of little value, except for acting as a channel to convey a supply of sap to the upper portion of the tree, where the foliage is most dense, and where—when the tree is in such condition—it is most needed. This is not the state in which a peach tree should be. The young growth should be evenly distributed over the whole tree, especially over the lower portions. To obtain the desired effects the tree must be given proper and skilful treatment from its earliest inception, and trained in such a manner that the main arms are well placed and strong, so as to be able to stand the strain of heavy crops without breaking. To have a tree in this state one must start with the yearling tree as received from the nursery; it is either one that has been pinched back in early summer and has developed three or four good leaders or one that has grown straight up and has several short laterals. To start the latter in the way it should be trained, choose the strongest laterals at a distance of about 15 inches from the surface of the soil, then cut the remainder of the tree away at the base of the foremost of these, reducing the three laterals to about three buds; these become the main arms of the future tree. The one which has been pinched back in the nursery already has the main arms or leaders formed, and these should also be cut back to three or four buds. From these the following year may appear several strong leaders; at the next winter pruning the strongest and best-placed of these are cut back to about 12 in. or 15 in. Those not required for main arms can be entirely dispensed with. By this time one should have a tree with a good foundation, the summer following this should show a strong-growing, densely-foliaged tree, which will require a light thinning out of the centre—this should be done during January. Up to this time no provision has been made for fruit, but this can be done at the next winter pruning, which is the third from time of planting. At this period (winter pruning) one must use good judgment, as there are several strong growths, all of which would make good leaders. Decide which of these are best placed and will make the best leaders, then cut them back to from 12 in. to 30 in. according to growth; the remainder of the strong shoots can be entirely dispensed with, retaining the shorter and weaker ones which are termed laterals. Some growers are in the habit of shortening these back; the writer does not favour this; for after a lengthy experience in growing peaches for profit, I find that it is better to leave these laterals the full length. I have experimented on several different systems for a number of years, and now only practise one, which I find to be simple and most profitable, and will also keep the tree growing in a vigorous condition. But one must not shorten laterals, for if this is done the best fruit buds are cut away and invariably the buds left are weak, and the blossoms often drop off, and what promised to be a good crop diminishes to a small one. The system advocated for treating the laterals after the tree is well shaped and old and strong enough to bear fruit is to retain all the short, well-matured ones, and cut away the stronger ones, of course always making provision for the leaders. Those that are retained will bear fruit the following summer; after fruiting they will become barren for all time, the terminal bud growing for a few inches, sometimes a foot or more. After the laterals have fruited they must be cut hard back at the base; others have appeared from the place or thereabouts where the stronger ones were cut back the previous winter. The majority of this new wood is left to carry the following season's crop. Where you cut away that which has fruited provision is made for a further supply of new wood for aonther crop the following year. Always dispense with the wood that has fruited; never leave two-year-old laterals in the tree. Let the one-year-old laterals fruit; while these are fruiting others are growing to replace those that have been cut away, and in turn these are disposed of and others again take their place. Given this treatment, the peach will bear heavy crops every year, not only on the top of the tree, but at the bottom also. The leaders should always be cut hard back, say six to eight buds, so as to give them strength; also have them well and evenly spaced. Sometimes they require to be cut back to an inner bud, so as to prevent them being too low or too horizontal, and getting in the way of the plough and cultivator. Occasionally it is a wise plan to cut strong growing laterals about half way back so that more laterals will shoot out.

RENOVATING OLD TREES.

There are many very old peach trees in orchards that are bearing very small crops. In most cases such trees are in good heart and only require skilful treatment to bring about a return of good crops. The writer has pruned many such trees during last winter, and in visiting them again lately found that they, as was expected, have responded splendidly to the treatment given. They are full of new wood, which augurs well for next season's crop, to the great delight of the various owners. There are two ways of bringing an old tree back to a young state again. One is to cut them down to within a few feet of the ground, and depend upon the dormant

buds breaking out and sending forth new growth, and building a new tree up. This method I do not advocate, for unless the roots be very healthy the stump will often die. The second method is to saw any branches that are growing in the centre of the tree away, also those that are too low down, and those that are most exhausted. also dead wood. Do not be afraid of cutting too many limbs out, and do not leave any short stumps, as they invariably die back; cut all limbs close back and trim the edges off with a sharp knife, and paint over. After disposing of these limbs, shorten the remainder back a foot or two. The summer following on this pruning there will be furnished over the whole of the tree a supply of new wood, which may surprise the pruner. During the next winter pruning some of this new growth may be wanted to take the place of some of the old leaders; if so, choose those best suited for the purpose. Of the other young growth, half of it should be dispensed with, retaining the remainder to carry a crop the following summer; this in turn is cut away during the next winter pruning, again leaving more new laterals to carry another crop. Repeat this treatment of new wood each year. In addition to cutting away some of the larger limbs smaller ones can be removed the following year. After about two or three years of this treatment you will have practically a new tree in place of the old one.

THE BANANA BEETLE BORER.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) has made available the following report by Mr. Froggatt, the Entomologist who is especially engaged in investigating the Banana Beetle disease.

With all insect pests that have not had sufficient notice taken of them in their initial stages, and which the apathy of those vitally concerned has allowed to increase until they become a decided menace, there is no simple means for a cure. It is only by steady and persistent work in gradually reducing the numbers of the pest that it can first of all be checked, and then by further efforts, consistently sustained, that it can be reduced to a negligible quantity if not completely overcome.

The Banana Beetle Borer, a case in point, differs so markedly in its habits from the general run of orchard pests that the common means of control, such as spraying, &c., are absolutely of no avail. Throughout the whole life-cycle, the insect does not come on to the surface, and the adult beetle does not leave the plant until it is mature.

Under ordinary conditions, there are no openings into the heart of the corm through which the grubs can be reached, and even where beetles have eaten their way out, the old tunnels are so closely packed with the sawdust-like excreta, that the result is virtually the same.

Methods for attacking it are, therefore, limited for the present at any rate, to the adult stage. As the beetles are scattered in the soil, principally in and around the stools and amongst rubbish in between the rows, means of gathering them together as far as possible in one spot in order that they may be more readily collected and destroyed have first to be considered. The most satisfactory method so far found is to lay pieces of clean corm or the base of stems cut surface downwards on the bare ground in or just outside infested stools, or where infested corms or stems are found lying on the ground. The beetles collect on the under-surface of these baits, and by turning them over early in the morning the beetles can be collected and destroyed either by burning, crushing, or other suitable means to hand.

And then arises the greater question, how to reduce the numbers breeding? This is wholly a question of keeping the plantation free from superfluous banana plant material in such a state that the grubs can reach full development therein. Infested plants and bulbs must be dug out and the corms cut into small pieces and the stems cut in halves lengthways; any old corms or stems lying on the ground should be treated in a similar manner. It is preferable to burn this material wherever possible.

It is of little, if any, value to carry out these measures for a time, and then cease from labour thinking the pest is wiped out. Many, acting under this misapprehension, have found to their cost that the beetle borer is an enemy which must not be underrated. Those who realise this fact, and are ready to work against this menace along the lines indicated, will soon reap the beneficial results of their labours.

By further experimentation the work entailed in combating this insect may be greatly simplified, but the tests are not yet sufficiently far advanced to enable conclusions to be drawn from them.

CANE PEST COMBAT AND CONTROL.

The Entomologist to the Bureau of Sugar Experiment Stations, at Meringa, Mr. E. Jarvis, reports under date, 13th December, 1922, as follows:—

Effect of Dry Weather on Cane-Beetles.

In my October report it was mentioned that excavations made in canefields at Highleigh and Meringa had revealed the presence of grey-back beetles in the pupal chambers. It may be stated that the date of these investigations, which was inadvertently given as 10th September, should be corrected to read 10th October.

Upon looking up weather statistics, in relation to rainfall, it appears that the present drought conditions are very similar to those experienced in this district during 1915, when the precipitation for the months of August to November was only 1.74 inches.

Beetles during that year assumed the adult form about the middle of September, and, in spite of abnormal dryness of the soil, were subsequently found alive in their pupal chambers at the end of October.

A month later, however (28th November, 1915), plenty of dead grey-backs were ploughed up on volcanic soil, no living ones being observed. The depth of cultivation on this occasion was 1 ft., in ground fairly loose and very dry.

It appears, therefore, that in certain soils adults of this species are unable to remain alive underground in dry weather longer than from nine to ten weeks. From June to August, while grubs of these beetles were pupating, 5.30 in. of rain were registered, as against 7.19 in. for the same months during 1922. It is interesting to find that since the beginning of September last to date (28th November), we have recorded only 1.79 in. at Meringa (5 points more than fell during the same period in 1915).

In the event of the present dry conditions continuing for another week or so, multitudes of grey-backs that assumed the imago state about seven weeks ago are likely to die in the soil; while others, arising from grubs that pupated later in the year, will be so weakened by protracted confinement underground that if able finally to emerge from the soil next month (December) they may succumb prematurely before able to lay eggs.

In 1915, for instance, beetles that managed to reach the surface when the drought broke in December could not withstand a slight heat wave lasting a couple of days—when the maximum shade temperature ranged from 95 deg. to 98 deg. F.—but simply fell dead in thousands from the feeding-trees. No less than ninety-eight specimens were picked up on an area of about 2 square chains, and twenty-five from under a single gum-tree of moderate size.

The occurrence of such heavy mortality was of exceptional economic interest from the fact of its having happened about seven days after emergence of these beetles, and consequently before they had had time to oviposit. Several were dissected, and the ovaries in all examined were not fully developed, while in some specimens the eggs were half grown.

Breeding Tachinid Fly-Parasites.

During the past month we have built an additional large insect-cage for breeding specimens of *Ceromasia sphenophori*, the tachinid parasite of our beetle borer of cane. This new cage (see accompanying photo.) has a floor area of 56 square feet, and is 7 feet 6 inches high (internal measurements). It is constructed of hardwood, the sides being of mosquito-netting and the roof and hood of strong calico.

Provision has been made for the establishment of conditions resembling as nearly as possible those obtaining in the field, for excluding insect enemies of the fly, and combating entomogenous fungi. Further liberation of parasites has been made this month at Gordonvale, Mount Sophia, and Aloomba.

At the present time, being near the end of the cutting season, it is not easy to procure bored sticks from which to obtain grubs for carrying on our breeding of this useful insect. Growers having any standover cane affected by borer-grubs, and who may be willing to help us in this work, are asked to communicate with the writer. Tachinid flies will be liberated free of charge on plantations seriously affected by the beetle borer (*Rhabdocnemis obscurus*, Boisd.) on condition that the owner will agree to leave at least half an acre of badly-bored, unburnt cane for the parasites to breed in.

Scarcity of Grubs.

The 1922-23 season will see the appearance during next month (December) of vast numbers of a small brown cane-beetle (*Lepidiota frenchi* Blackb.) which fortunately has a two years' life-cycle, and, although emerging each season, occurs in greatest numbers every second year. The third-stage larvæ of *frenchi* are generally destructive to cane from August to November—at a time when grey-back beetles are either underground in the pupal or imago forms, or have oviposited and produced first-stage grubs, which, however, have not commenced to seriously injure the roots.

Both these beetles lay their eggs during December or January, the grubs of *albohirtum* attaining full size in a period of about six months, whereas those of *frenchi*, which mature very slowly, remain in the larval conditions fully a year longer; thus accounting for occurrence in the same furrow, so often noticed by growers, of large and comparatively small grubs. Fully-grown grubs of the latter insect are

PLATE 1.—INTERNAL VIEW OF CORNER OF CAGE FOR BREEDING TACHINID FLIES.

Showing growing cane sticks stocked with Borer grubs ready for the flies to parasitise. Note the holes in middle of internodes, made when inserting the grubs, and plugged with fibre obtained from cocoons of the beetle-borer. Each stick contains 10 to 15 grubs, and is able, under favourable conditions, to produce about 50 tachinid parasites.

usually mistaken for those of *albohirtum,* which they closely resemble in size and general appearance. As mentioned in a previous report (''Australian Sugar Journal,'' Vol. VIII., p. 917) *frenchi,* although feeding habitually on roots of cereals and various herbaceous plants, has acquired a decided liking for cane. Although one of our serious cane-beetles, being second perhaps to *albohirtum* in economic importance, this insect oviposits as a rule in uncultivated soil densely covered by grass, weeds, &c. This being the case, it behoves growers, as I have advised in a previous report, to maintain during December and January a system of clean culture on areas devoted to cane, and more particularly on fallow land that may be reserved for the planting of an early crop. Both *Lepidoderma albohirtum* and *Lepidiota frenchi,* which usually lay their eggs during these months, are strongly attracted by a luxuriant growth of vegetation between the rows, so that land left in this condition runs a risk of becoming badly infested.

At the present time, cane-grubs are not easy to procure, owing to the prolonged spell of dry weather, so that experimentation against this stage of our grey-back cockchafer has been discontinued for the time being. Very few insects affecting cane have appeared so far, although odd specimens of three or four species of cane-beetles are to be noticed occasionally on the wing during nightfall.

Large Moth-Borer of Sugar-Cane.

This moth pest (*Phragmatiphila truncata,* Walk.) is usually in evidence throughout November and December, at which time of year it attacks principally shoots of young ratoon and plant cane from 9 to 24 inches in height. Attempts to procure additional specimens of its parasite (*Apanteles nonagriæ,* Oliff.), the economic value of which was alluded to in last month's report, have not yet proved successful; but, as it is usually the later broods of *truncata* that are most freely parasitised, we shall probably breed these tiny wasp-parasites from borer caterpillars collected during December. On the 6th instant, fifty-eight ratoons with ' dead hearts ' were collected by Mr. H. Knust, at Banna, which when examined yielded forty caterpillars of this moth-borer, the tunnels of the remaining eighteen shoots being empty. These larvæ pupated in due course, and moths commenced to emerge in the breeding-cages about the 18th instant.

Notes on Para-Dichlorobenzene.

We are hoping that the price of this fumigant in England or America may prove to be less than that quoted from Germany.

During field experiments, however, it will be possible to test various methods of application in order to determine the minimum amount of *P. dichlorobenzene* needed per acre to destroy from 80 to 100 per cent. of the grubs. Doses of one drachm placed a foot apart should prove effective if injected in time to catch the first stage larvæ; and this would cost about £4 per acre. By placing these doses 18 inches apart the expense could be still further reduced.

In the event of our being able to purchase the fumigant for 9d. per lb. we reduce the above figures by one-half, and could then well afford to give one-drachm injections a foot apart at a cost of £2.

THE QUEENSLAND COTTON INDUSTRY.

REVIEW AND PROPHECY.

Subjoined are summaries of important interviews accorded to an influential Southern paper on the subject of Queensland's cotton industry by His Excellency the Governor (the Right Hon. Sir Matthew Nathan) and the Premier (Hon. E. G. Theodore) and which are of especial interest to cotton-growers.

Cotton-growing as a Queensland Industry.

His Excellency Sir Matthew Nathan in the course of a Press interview expressed a thorough belief in cotton-growing as a Queensland industry, and remarked—

''It seems that the conditions of the soil and climate are such that we can grow here the best sort of cotton. Under existing conditions in Australia, it is only with such an article that we can count on permanently competing with other producing areas. There will always be a market for the produce of the highest quality, even though much more has to be paid for it than for a lower quality. I should view with little satisfaction any great extension of cotton-growing in Queensland if an inferior article were produced, even if it were to be for home consumption, as this would be

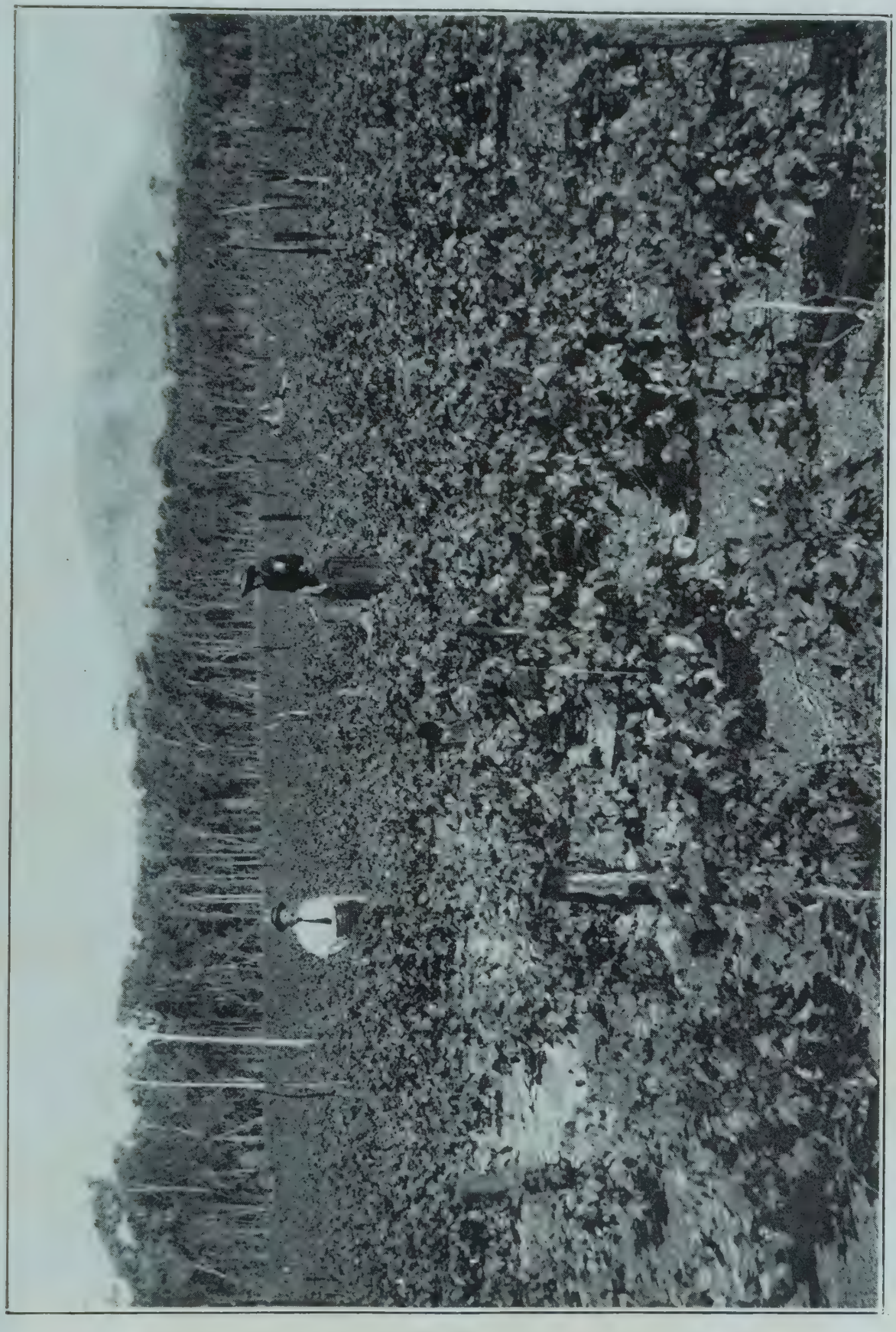


PLATE 2.—COTTON PLANTATION ON VIRGIN LAND, DAWSON VALLEY, CENTRAL QUEENSLAND.

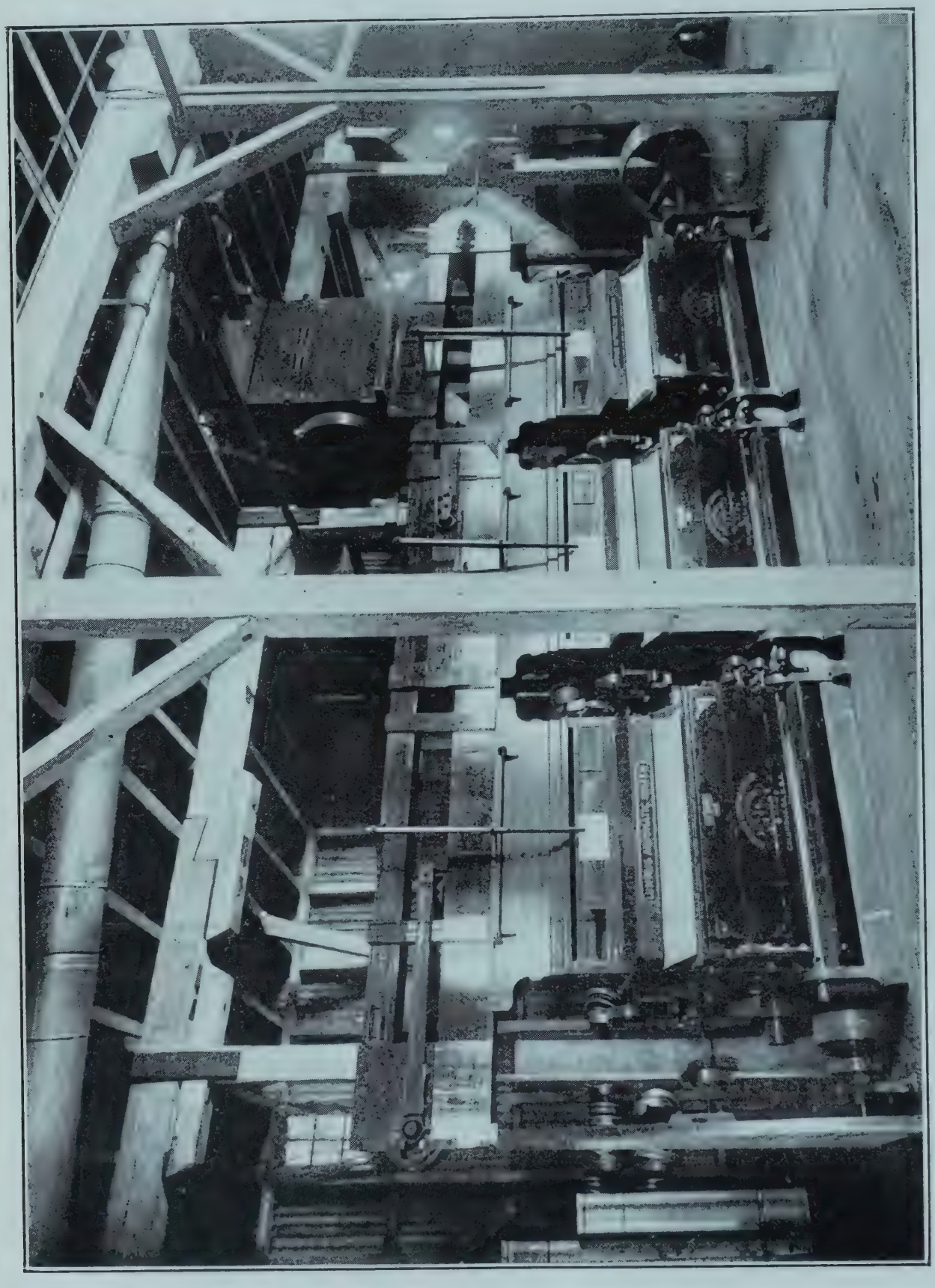


PLATE 3.—COTTON GINNERY (INTERIOR), ROCKHAMPTON.

bound to lead to a deterioration in the cotton for export, and so to the loss of any remunerative export trade. To produce the best cotton it will, of course, be necessary to have, in addition to our favourable natural conditions, the best seed, planted in the best way, and the best cultivation.''

Sound Farming Practice Necessary.

''Ultimate success depends on the farmers and they will have to realise that it is much wiser to cultivate a small area well than a larger one indifferently. Some of the cotton lands I saw last May were badly cultivated, owing, as I was told, to the farmers' haste to realise a big return in the season. In this direction lies disease, which may well spread from the ill-cultivated to the well-cultivated cotton farm at Wowan, as it has gone from the neglected to the cared-for orchard at Stanthorpe. I do not imagine, however, that the best cultivation is an absolute specific against disease in these lands so favourable to all forms of life, noxious as well as beneficent.''

PLATE 4.—COTTON PICKING, DAWSON VALLEY, CENTRAL QUEENSLAND.

An Element of Mixed Farming.

''The possibility of disease is one of the reasons why I do not believe in the entire dependence of any farmer on cotton. Another is the possibility of fall in price. There will not always be a guarantee, and though I believe, as I have said, that there will be a permanent paying market for the best cotton, it will be necessary for farmers to have some other standby.

''Some farmers came to grow cotton in corresponding circumstances of temporary depreciation in dairying. Wowan dairy-farmers would have gone under if cotton had not saved them. I can quite conceive dairy produce doing a similar service to cotton-growers in the future.

''For these reasons I believe in cotton-growing as an element of mixed farming in combination with dairying, sheepraising, possible wheatgrowing, rather than in exclusive plantations.''

The Picking Problem.

"Another reason for small plot cultivation is the labour required for picking. I am doubtful if it would be to the advantage of the State that another great industry in it should become dependent on a large body of seasonal labour, which would have to be paid in inverse proportion to the shortness of the period for which it would be required. Indeed, it seems possible that payment with this consideration in view might make the industry impossible. But the employment of seasonal labour cannot be avoided in the cultivation of larger areas than can be picked by the farmer himself, and those permanently associated with him on the farm. These areas can easily be calculated on the basis of the labour available for the period of picking, of the estimated aggregate picking capacity of the individuals composing it, of the estimated production per acre, and of the time during which picking can be carried on.

"I think it may be taken that a single adult can pick about 5 acres in the season, and that from such an area he should clear, under the present guarantee, about £100 a year. Taking families and the comparatively few cases of labour permanently employed on the farm into consideration, we may hope to see a great number of farms from 5 to 30 acres in area. I have heard that 75 per cent. of the cotton catered for by the Rockhampton ginnery will come this year from farms where outside labour will not be employed for picking. I shall be glad if this percentage is general through the country, and increases.

"I believe that a very large number of farmers growing, as part of their scheme of mixed farming, cotton of the best quality, cultivated in the best manner on such areas as can be picked without the engagement of temporary labour will bring great wealth to Queensland and some of the population it so urgently requires."

The Commonwealth Cotton State.

Points from Hon. E. G. Theodore's remarks in the same journal—

Queensland, with its vast area of fertile land, equable climate, decentralisation of population, extensive and rapidly-extending transport systems and other outstanding advantages, both natural and developed, must become inevitably one of the greatest producing States of the Imperial Group. In building up that prosperity, cotton-growing opens out a vista going far beyond sight.

Unrivalled natural wealth yet latent will place Queensland in a premier position as the Commonwealth Cotton State. Already on much cheaper lands we have grown staples equal to those of any other cotton country in the world. These lands are generally high-class agricultural and fruitgrowing areas, but uncertainty of remunerative markets for ordinary produce has hitherto kept them out of use; for cotton, however, the market is practically unlimited.

Last year in Queensland 1,800 farmers aggregated a side-line crop of cotton worth £90,000 off about 7,000 acres. This year seed has been distributed to 10,361 settlers to sow 129,211 acres. Next year, we expect to have 250,000 acres under crop, but there is nothing to prevent the area being increased until, within a few years, it reaches 5,000,000 acres. There is that area of Crown lands suitable in every way for cotton and served by existing railways and ports, and which can be made available by the Government if it is demonstrated that the crop is payable and permanent.

Successful settlement on cotton areas will be the most effective means of fillling Queensland's vacant spaces. For every 1,000 settlers there are work and subsistence for 10,000 men, women, and children; so if our anticipations are realised there may be eventually a population of 1,000,000 people dependent upon this great prospective industry alone.

That is the very best kind of immigration scheme that can be devised. With land available on which the new settler can be assured of a marketable and profitable crop there will naturally follow such an influx of people to Queensland that artificial schemes will be superfluous.

The cotton industry does not involve drudgery on farmers and their families. It is a pleasant, desirable, healthy occupation, and will lead to making agriculture more popular as well as profitable.

Provided suitable seed is sown and kept pure, no reason can be advanced against Queensland cotton prospects that would not apply with equal force to other cotton-producing countries.

Any intention to grow cotton must be backed by an intention to grow the best.

Quality of product must be sustained at a high level and the Queensland Government is doing everything possible to produce and supply to growers high-grade seed of suitable types. This side of the cotton business calls for sound organisation, high intelligence, and the keen co-operation of growers.

Intensive rather than extensive cultivation is desirable, but where conditions fit, larger fields will surely prove an economical proposition.

Continuity of seed selection will standardise crops, and continuity of quality will stabilise values.

Under existing conditions cotton-growing is more suitable as a sideline in diversified farming than as a sole source of income.

Among the essentials of success are right choice and preparation of soil, seed selection, careful cultivation and restriction of areas to an acreage that can be conveniently and profitably worked.

The Queensland cotton industry will also benefit by the State-wide system of rural organisation now proceeding vigorously along well-defined, scientific lines. The days of amiable aspiration and pious platitude in relation to the agricultural industry in Queensland are gone. Farmers have asked for facilities to exercise their right to the recognition of their calling as a business enterprise, and claim the same consideration extended to other branches of commerce, and the Government is standing by them.

PLATE 5.—A FLEECY FLAKE FROM COTTON LAND.

Photo. by R. Harding.]

PLATE 6.—IN QUEENSLAND COTTON COUNTRY—Members of the British Cotton Delegation at Gordon Downs, Capella District, C.Q.

Photo. by R. Harding.]

PLATE 7.—ALLUVIAL FLATS ON BELL'S CREEK, CALLIDE VALLEY—Inspection by the British Cotton Delegation.

Photo. by R. Harding.]

PLATE 8.—THE COTTON DELEGATION AT STAFF-SURVEYOR SUTER'S CAMP, BELL'S CREEK, CALLIDE VALLEY.

Left to Right: Mr. Crompton Wood, Mr. Crawford Vaughan, Mr. R. Harding, Mrs. Suter, Mr. Harold Parker.

Photo. by R. Harding.]

PLATE 9.—LENDING A HAND, WOWAN, DAWSON VALLEY.

Photo. by R. Harding.]

PLATE 10.—ON THE ROAD FROM KINGAROY TO BELL—SCRUB SCENE NEAR PORTER'S GAP, BUNYA MOUNTAINS.

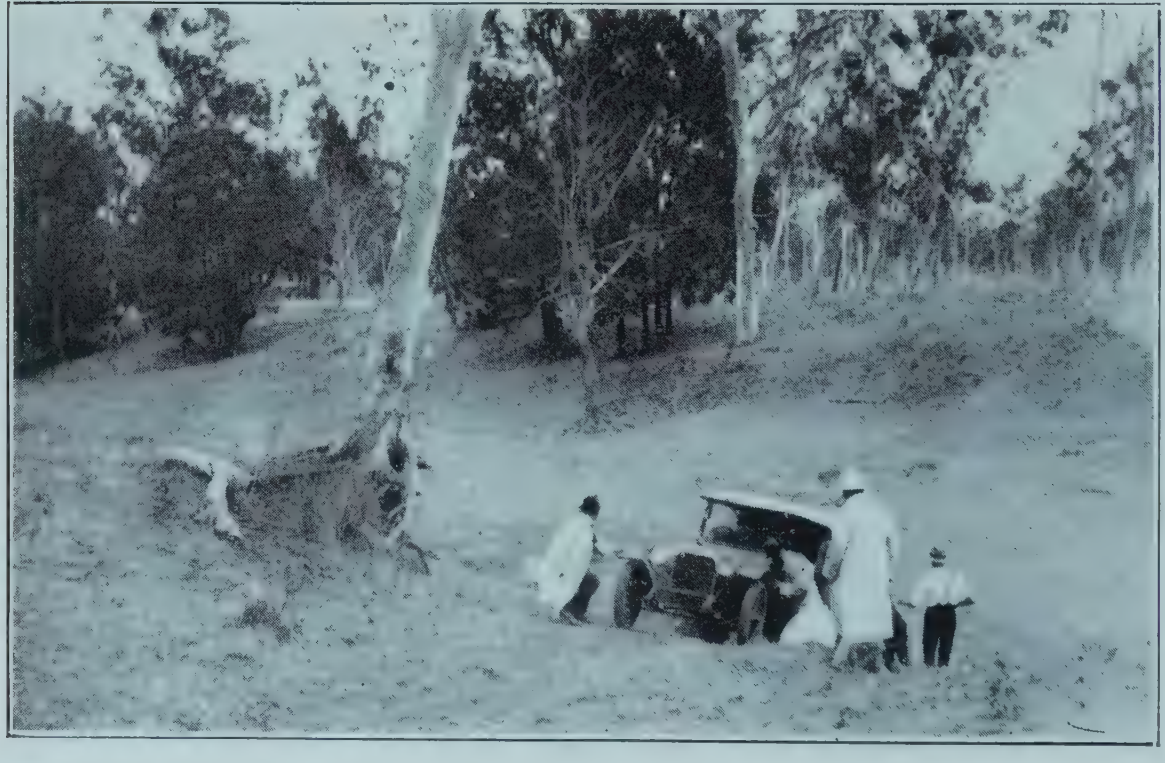


Photo. by R. Harding.]

PLATE 11.—THE DELEGATION AT WORK, CALLIDE VALLEY.

Photo. by R. Harding.

PLATE 12.—IN TRACKLESS LANDS. SCENE ON UPPER CALLIDE.

Photo. by R. Harding.]

PLATE 13.—A DON RIVER CROSSING, DAWSON VALLEY.

Photo. by R. Harding.]

PLATE 14.—AN EASY CROSSING. VIRGIN CALLIDE COUNTRY.

Photo. by R. Harding.]

PLATE 15.—A GLIMPSE OF THE CALLIDE VALLEY FLATS—KING COTTON'S UNFURROWED REALM.

Photo. by R. Harding.]

PLATE 16.—A SANDY PATCH EN ROUTE FROM BELL'S CREEK TO THE CALLIDE.

Photo. by R. Harding.]

PLATE 17.—COTTON DELEGATION INSPECTING SHIPPING FACILITIES, GLADSTONE JETTY.

Photo. by R. Harding.]

PLATE 18.—A PIONEER'S CLEARING NEAR PORTER'S GAP, BUNYA MOUNTAINS.

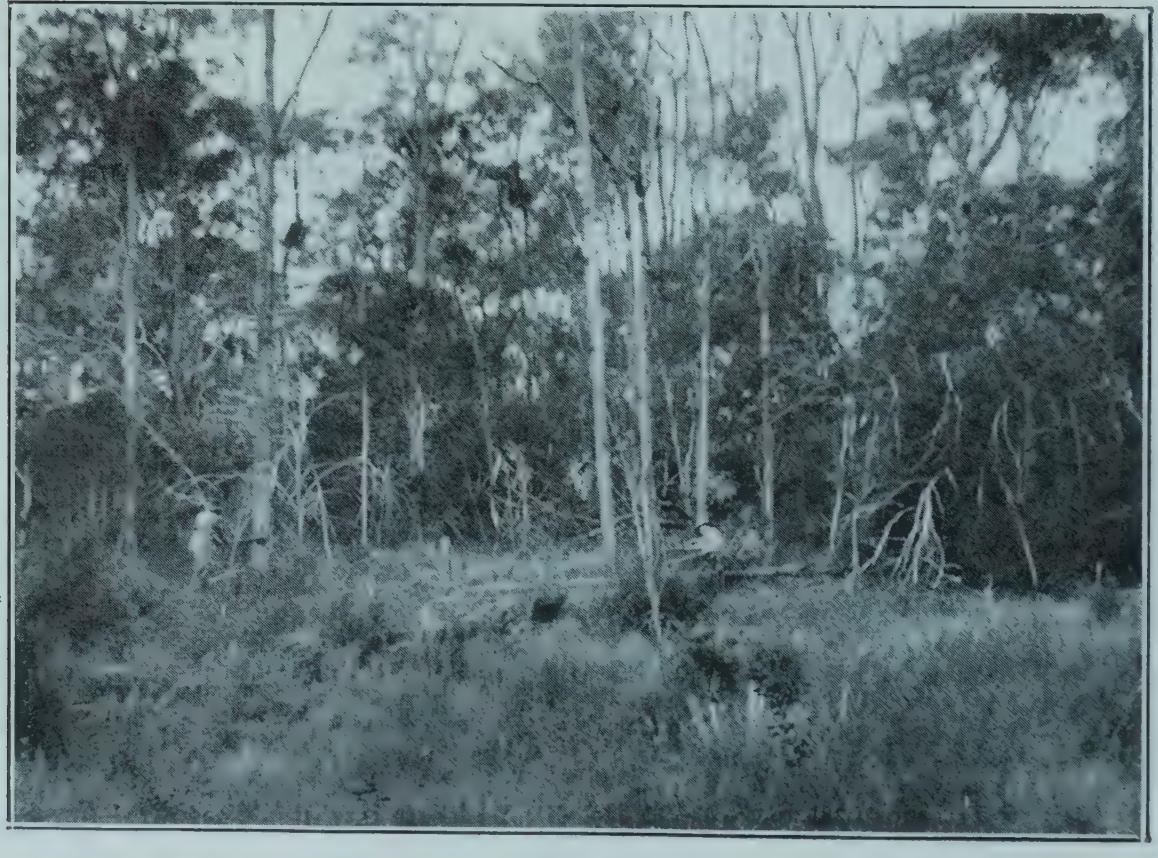


PLATE 19.—EXTENDING KING COTTON'S REALM—A PRELIMINARY SKIRMISH.

PLATE 20.—A TINGOORA HERD OF FRIESIANS. Scene on Ryfield, Mr. P. P. Fall's Farm.

Photo. by R. Harding.]

PLATE 21.—ON GUM AND APPLE PASTURES. A Homestead Outlook, "Marshlands," Wondai.

BANANA BUNCHY TOP DISEASE.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) has made available a report of investigations of the Bunchy Top disease of bananas made conjointly by Dr Darnell Smith (Vegetable Pathologist of the New South Wales Department of Agriculture) and Mr. Henry Tryon (Vegetable Pathologist and Government Entomologist, Queensland). The disease has spread across the border into the south-eastern corner of this State and is causing much loss to growers and concern to departmental officers. Both officers visited the affected border areas and studied the malady from every angle and noted local remedial measures and experiments. Notwithstanding close observations and the knowledge of affecting facts no definite exclusive cause of the disease was discovered. Further, they concluded that the explanations with reference to its origination in the individual plant, put forward without—as far as could be ascertained—positive experimental evidence of a conclusive nature had not advanced their knowledge of the subject. However, the New South Wales investigations and especially its field experiments directed to definite phases of the question, would, as far as they had proceeded, appear to have narrowed the inquiry materially; suggesting, as they did, that certain theories put forward to explain the incidence and mode of action of banana bunchy top had now to be dismissed as untenable.—Ed..

Theories relating to the following possible agencies in promoting plant sickness were investigated:—

1. Soil Depletion, by the Loss—to Some Extent Absence—of Essential Banana Plant Food Constituents in it.

Fertiliser field experiments have rendered it evident that the use of complete fertilisers of varying constitution, as well as fertilisers providing a single essential plant food requirement, do not prevent the occurrence of the disease, either in soils relatively rich or in ones relatively poor, as ordinarily understood.

[NOTE.—These experiments, which have been conducted on proper lines, have, however, not so far related to humus-producing fertilisers nor covered the entire range of soil-types.]

2. Loss of Vigour in Banana Plants—e.g., by the Continuous Use of Banana Plants of a Single Origin.

Although the general habit of the plants in which the disease may manifest itself, including such plants as receive fertilisers as a field routine procedure, and although the high quality of the banana fruit that the district generally yields, would appear to be conclusive as to the "strain" of plants generally grown not having developed weakness, and so disease, this factor—hypothetical impairment of stamina—has not been lost sight of. It has now been shown experimentally to be non-operative by the manifestation of the Bunchy Top disease in plants introduced into the affected area from remote districts in which there has been no history of the occurrence of the malady, equally with those of local origin. One of these experiments, in which banana corms were obtained from north of Cairns, Queensland, covered no less than ten distinct field plots in the Tweed District.

3. Soil Acidity.

The factor of soil acidity, which might be presumed to operate in promoting the occurrence of disease, has been the object of test experiments with so far negative results. Ant-acids applied to the soil, whether in the form of lime or basic phosphates, having failed to protect plants from the disease occurrence—even ones introduced from "clean areas."

4. Soil Contagion.

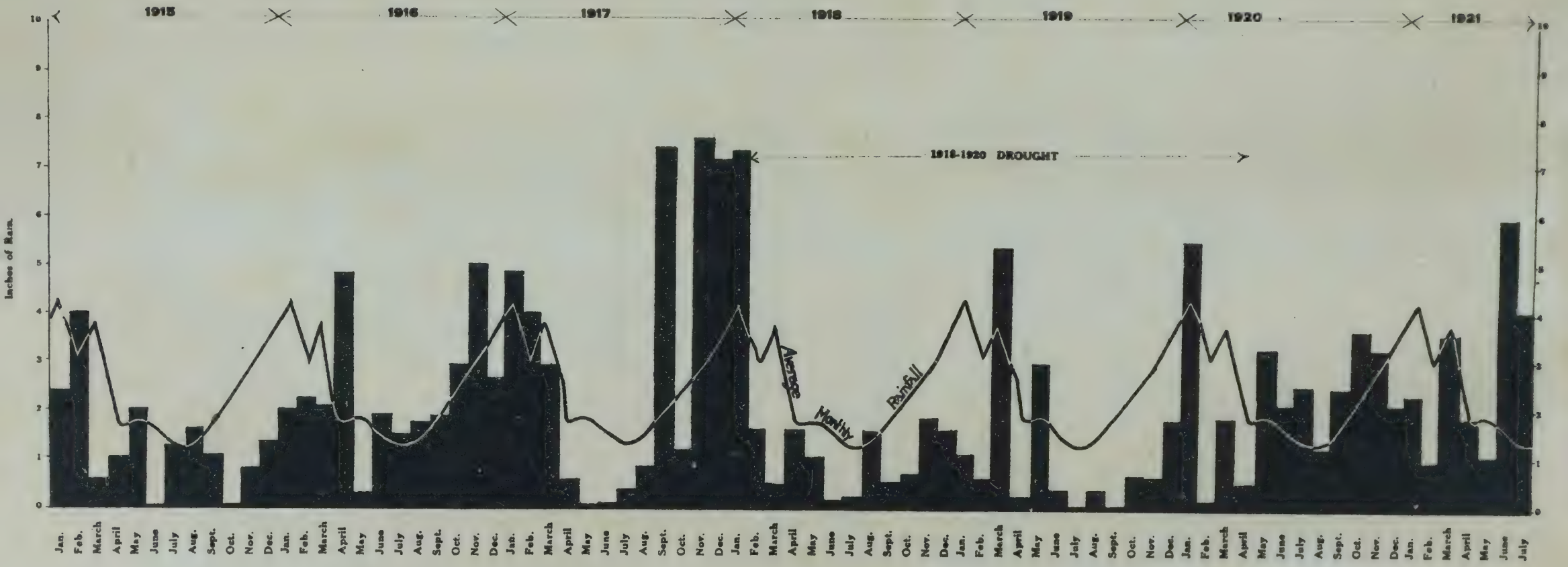
Field experiments have again shown that the disinfection—by one or other fungicides—of suckers in planting, and simultaneously that of the soil with which they are brought in contact, does not prevent the occurrence of the disease in plants derived from such suckers.

5. Definite Parasite Action.

Again, investigations have so far failed to reveal the presence of a fungus-organism or of fungus-organisms capable of originating Bunchy Top under experimental conditions, although certain ones, included in groups in which undoubted plant parasites occur, have been met with by one of us. (The inquiry, however, is still in progress.)

RAINFALL CHART.

QUEENSLAND AGRICULTURAL COLLEGE


1915
1916
1917
1918
1919
1920
1921
1918-1920 DROUGHT
Average Monthly Rainfall
Inches of Rain.
0
1
2
3
4
5
6
7
8
9
10
Jan. Feb. March April May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. March April May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. March April May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. March April May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. March April May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. March April May June July

6. Animal Parasites.

A nematode causing plant injury that we have commonly found in connection with the roots of Bunchy Top affected plants, not being invariably found to occur in this association, cannot be the exclusive cause of the malady. That any insect is inculpated has not been shown definitely to be the case.

[NOTE.—Some notoriety has attached to the pronouncement that a particular insect—the Banana Aphis (*Pentalonia nervosa*)—serves as the communicator of the disease between one plant and another, or even is its prime cause in healthy plants, and although general observations do not favour the explanation a remedy involving this insect theory is being tested in the New South Wales portion of the infected area.]

7. Climatic Factors.

The prejudicial effects of meteorological conditions unfavourable to the growth of the banana plant, those only gradually manifested in the course of years, cannot be settled by direct experiment. It appears, however, to be interdicted by what is known regarding the geographical range of the Cavendish and of other banana varieties, not only in the Tweed area but elsewhere. In regard to the former, there is evidence that in the past an abundant yield of good fruit has been raised from healthy plants for eight or ten successive years.

8. Climatically Injured Soil Conditions.

No evidence as to the nature of the change spontaneously produced in the soil under banana crops, since its adaptation from its original condition as a scrub or forest soil to this cultural use was obtained. This is a matter amongst others that it is proposed to be inquired into.

9. Prevention and Cure.

Both these are dependent on a knowledge of the cause of Bunchy Top disease or must have relation therewith. Not knowing the cause they cannot be predicted, and moreover we have not sought to discover them by empirical procedures conducted in this respect in the dark.

10. Further Research.

Further scientific inquiry on the cause, prevention, and cure of Bunchy Top disease is still called for. This inquiry should embrace both field and laboratory experiments and research. The bestowal of the fullest measure of scientific thought and endeavour in respect to the disease is urgently necessary.

ORANGE SUCKING BUGS.

By A. H. BENSON, M.R.A.C.

Two kinds of sucking bugs—viz., the Bronze Orange Bug (*Oncoscelis Sulciventris*) and the green or Spiny Orange Bug (*Biporulus bibax*)—both of which are native insects confined to Queensland and the northern coast districts of New South Wales, have been well known to orchardists for many years on account of their abominable odour and the damage they cause to citrus orchards, both to the fruit and the young tender shoots.

For a long time these insects were not looked upon as a very serious menace, as they were seldom met with in very large numbers, being evidently kept in check by natural agencies; but during the past three or four years their numbers have increased enormously, until during the present season a gallon or more bugs have been taken from a single tree in one day, and serious loss has been experienced by growers owing to the large quantity of fruit that has been destroyed, to say nothing of the young growth that has been killed.

In order to determine the best method of dealing with these pests it is necessary to possess a thorough knowledge of their life-history and habits. Fortunately these are and have been well known for many years, but unfortunately this knowledge has not been taken advantage of as it should have been. As already stated, both of these sucking bugs are native insects which, prior to the introduction of cultivated varieties of citrus fruit, fed on our native species of citrus—which were common in our coastal scrubs, but are now much less numerous—as well as on other native plants belonging to the same natural order "*Rutaceæ*."

These native citrus and other plants belonging to the same natural order still provide a breeding ground from which the fully developed bugs can fly to cultivated orchards, and it is possible that they may have been the source from which a large number of the fully developed bugs that have been met with recently in the orchards have been derived. From the information submitted by growers, there has apparently been a regular influx of mature bugs from an outside source in the case of orchards where the bugs have been regularly and systematically gathered and destroyed, and which could not therefore have been bred in the orchard.

Life History.—

The life history of the bug is briefly as follows:—

The mature female bug deposits her eggs in clusters of about ten or a dozen on the leaves of citrus trees or other host plants. These eggs are about the size of a No. 5 shot—white in colour and possessing a pearly lustre. The shell of the egg is hard and not easily acted upon by any spraying material, so that it cannot be destroyed by spraying.

In a few days the young bugs hatch out from the egg clusters, the exact time depending on weather conditions. When they hatch out they remain clustered together for some time, and finally distribute themselves over the tree.

From the time they hatch out from the egg till they become fully mature insects (a period of a month or longer, according to local conditions), the young bugs are unable to fly. They, however, undergo several moults and change their colour first to a yellow, then to a red, and finally to a dark bronze-green in the case of the Bronze Orange Bug, and first to a yellow then to a green, and finally to the dark green of the fully matured Green or Spiny Orange Bug.

As soon as the young bugs leave the cluster in which they remained for a time after they had hatched out, they start in search of food, which they obtain by sucking from the stem or skin of the fruit or from young tender succulent growths, using their rostrum or sucking trunk, with which they easily pierce the skin or soft bark for this purpose.

Methods of Destruction.—

It will thus be seen that there is very little chance of poisoning their food, as, so far, there is no known method of poisoning the sap of a tree so that the insects feeding thereon by suction may be destroyed. Other methods of destruction must therefore be employed, and they consist of the following:—

First.—Get rid of all sources of infection, such as native citrus or other plants harbouring and breeding the bugs, isolated trees of cultivated varieties of citrus fruits that have been allowed to run wild, and all citrus trees in neglected or abandoned orchards.

Second.—Gather and destroy every mature bug, partly developed bug, egg cluster, or cluster of young bugs, early in the season. This work should start in July and be systematically followed up by *every grower of citrus trees.* If this is done, there will be very little, if any, loss.

Third.—As the young bugs are easily killed by means of oil or caustic sprays, these should be used regularly before the insects become fully developed, when their body is so well protected by the wing covers and hard covering that sprays have little effect on them.

Fourth.—As the bugs, both immature and fully developed insects, are always sluggish at daybreak, they can be easily shaken on to a cloth or sheet placed under the tree, or they will run to the centre of the tree from which, if it has been properly pruned, they can easily be brushed off on to the sheet. Tapping the outside of the tree with a padded stick is better than shaking the tree. The success of this method depends on the work being *carried out the first thing at daybreak,* for when the sun is well up the mature insects fly as soon as disturbed, and the immature bugs will hang on to the tree and not fall.

Fifth.—Hand gathering the eggs and the bugs, in all stages, whenever seen.

Sixth.—Cyaniding destroys many bugs in all stages, but is too costly to use for this purpose solely.

Seventh.—Deal with the bugs promptly; do not delay action because only a few are to be seen, but stamp them out before they have time to breed.

Prompt Action Necessary.—

Prompt and combined action is the secret of success in dealing with pests of this nature, and the neglect to take such action is largely, if not entirely, the cause of the present infestation, as the large number of bugs did not all breed at once, but are the progeny of many different hatchings.

Pests of this nature and others, such as locusts and caterpillars that destroy grass, grain, or hay crops, can be kept in check if dealt with as soon as they make their appearance, and the damage they cause will be reduced to a minimum by prompt and concerted action, without which no remedies are effectual and serious losses are bound to occur.

The question of dealing effectually with sucking bugs is therefore in the hands of our citrus growers, and now that they are well organised there should be little difficulty in bringing about concerted action for the destruction of this pest or of forcing careless persons who are simply breeding the pest to take the necessary steps for its destruction.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF NOVEMBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING NOVEMBER 1922 AND 1921 FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Nov.	No. of Years' Records.	Nov., 1922.	Nov., 1921.		Nov.	No. of Years' Records.	Nov., 1922.	Nov., 1921.
North Coast.	In.		In.	In.	*South Coast*—continued:	In.		In.	In.
Atherton	2·05	21	0 29	Nil					
Cairns	4 13	40	0·10	2·80	Nambour	3·85	26	1·46	3 98
Carlwell	4·13	50	1·65	0·42	Nanango	2·57	40	2·25	1·09
Cooktown	2·76	46	0·60	0 80	Rockhampton ...	2·17	35	2·21	1·93
Herberton	2·36	35	1·16	0·10	Woodford	3·20	35	2·50	3·56
Ingham	3·84	30	0·46	0·54					
Innisfail	6 35	41	1·93	0·89					
Mossman	4 52	14	0·60	1·12					
Townsville	1·84	51	0·21	0·01	*Darling Downs.*				
					Dalby	2·66	52	0·62	1·74
Central Coast.					Emu Vale... ...	2·57	26	3·78	2·06
					Jimbour	2·36	34	0·49	1·79
Ayr	1·75	35	2·82	0·14	Miles	2·49	37	0·29	1·14
Bowen	1 31	51	0·27	Nil	Stanthorpe ...	2·70	49	3·32	2·24
Charters Towers ...	1·58	40	0 10	Nil	Toowoomba ...	3·26	50	1·81	1·34
Mackay	2 91	51	1 56	1 46	Warwick	2·51	57	4·80	3·36
Proserpine	3 02	19	0·56	0·94					
St. Lawrence ...	2·34	51	0·72	0·53					
					Maranoa.				
South Coast.									
					Roma	2·05	48	0·26	1·12
Biggenden	2·70	23	1·77	2·42					
Bundaberg	2·69	39	0·17	1 68	*State Farms, &c.*				
Brisbane	3 69	71	3·53	3·24					
Childers	2 81	27	1·89	3 24	Bungeworgorai ...	1·96	8	1·09	1 77
Crohamhurst ..	4 39	30	3·86	2·76	Gatton College ...	2·60	23	2·71	0·48
Esk	3·13	35	3·27	1·53	Gindie	2 03	23	2·28	0·05
Gayndah	2 80	51	2·56	1·38	Hermitage ...	2 61	16	2·99	2·81
Gympie	3 16	52	2·46	3·01	Kairi	2·14	8	0·29	0 07
Glasshouse Mts. ...	3 74	14	1·24	3·48	Sugar Experiment Station, Mackay	2·62	25	1·74	1·32
Kilkivan	2 58	43	2·22	2·96	Warren	3·42	8	2·09	4·30
Maryborough ...	3 11	51	1·55	3·32					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for November this year, and for the same period of 1921, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
State Meteorologist.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, DECEMBER, 1922.

The weather throughout the month was very hot, and gave the competition birds a trying time. The outlying feature of the laying among the light breeds was a fine score of 155 eggs laid by N. A. Singer's pen, his B. bird laying the possible, 31 eggs. C. H. Singer's pen came second with 151 eggs. In the heavy breeds Mr. R. Burns came first with 137 eggs. There were several cases of moult, all among birds which had just left the broody coops. Broodiness has again been troublesome, and accounts for small scores among the heavy breeds. One bird died during the month, the cause of death being apoplexy. The following are the individual scores:—

Competitors.	Breed.	Dec.	Total.
LIGHT BREEDS.			
*N. A. Singer	White Leghorns	155	1,230
C. H. Singer	Do.	151	1,188
*W. and G. W. Hindes	Do.	132	1,104
*Bathurst Poultry Farm	Do.	135	1,046
*S. L. Grenier	Do.	133	998
*R. Gill	Do.	126	997
*G. Trapp	Do.	127	994
*W. Becker	Do.	135	984
*J. M. Manson	Do.	127	982
*W. A. Wilson	Do.	124	981
*Mrs. L. Andersen	Do.	116	977
*H. P. Clarke	Do.	127	967
*J. W. Newton	Do.	126	953
*T. Fanning	Do.	92	943
J. H. Jones	Do.	83	938
*G. Williams	Do.	124	926
*C. Goos	Do.	120	920
A. G. C. Wenck	Do.	84	916
*R. C. Cole	Do.	105	913
*Oakleigh Poultry Farm	Do.	105	905
*O. Goos	Do.	106	900
*R. C. J. Turner	Do.	131	896
*Mrs. R. E. Hodge	Do.	111	890
*H. Fraser	Do.	97	875
*F. Birchall	Do.	130	867
*M. F. Newberry	Do.	93	859
*J. W. Short	Do.	115	859
N. J. Nairn	Do.	122	857
*Mrs. E. White	Do.	104	843
B. Hawkins	Do.	98	843
*Thos. Taylor	Do.	108	833
*C. M. Pickering	Do.	92	833
J. Purnell	Do.	82	822
T. H. Craig	Do.	96	813
A. Maslin	Do.	107	806
*E. A. Smith	Do.	118	792
G. F. Richardson	Do.	89	766
B. C. Bartlem	Do.	93	756
E. Stephenson	Do.	72	747
E. Symons	Do.	69	735
H. Trappett	Brown Leghorns	100	719
Brampton Poultry Farm	White Leghorns	102	705
A. Anders	Do.	70	701
Parisian Poultry Farm	Brown Leghorns	58	469

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	Dec.	Total.
HEAVY BREEDS.			
*R. Burns	Black Orpingtons ...	137	1,100
*A. E. Walters	Do.	103	991
*T. Hindley	Do.	90	944
*C. C. Dennis	Do.	103	908
*R. Holmes	Do.	86	894
*E. F. Dennis	Do.	101	870
Mrs. A. Kent	Do.	88	868
Jas. Hutton	Do.	89	862
*H. M. Chaille	Do.	71	861
Mrs. A. E. Gallagher	Do.	100	841
R. Innes	Do.	90	800
*Jas. Potter	Do.	93	790
H. B. Stephens	Do.	88	776
Mrs. L. Maund	Do.	86	775
W. Becker	Chinese Langshans ...	77	749
*Rev. A. McAllister	Black Orpingtons ...	79	737
Wambo Poultry Farm	Do.	79	736
C. Doan	Do.	100	735
V. J. Rye	Do.	85	729
*Parisian Poultry Farm	Do.	83	728
Jas. Hitchcock	Do.	64	706
C. Rosenthal	Do.	91	660
W. C. Trapp	Do.	94	618
R. Burns	Silver-laced Wyandottes	74	589
*J. E. Smith	Plymouth Rocks ...	70	531
Miss L. Hart	Rhode Island Reds ...	54	443
Total	...	7,068	59,289

* Indicates that the pen is being single tested.

DETAILS OF SINGLE HEN PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total
LIGHT BREEDS.							
N A. Singer	181	231	191	212	200	215	1,230
W. and G. W. Hindes .. .	187	179	189	179	194	176	1,194
Bathurst Poultry Farm	145	158	188	182	202	171	1,046
S. L. Grenier	161	134	172	173	177	181	998
R. Gill	183	178	186	169	128	153	997
Geo Trapp	176	157	168	180	148	165	994
W. Becker	161	137	174	160	170	182	984
J. M Manson	167	145	170	151	184	165	982
W. A. Wilson	167	152	139	176	168	179	981
Mrs. L. Andersen	185	138	172	160	164	158	977
H P. Clarke	161	149	166	176	155	160	967
J. W. Newton	170	164	182	144	167	126	953
T. Fanning	123	166	175	159	198	122	943
G. Williams	148	157	175	158	152	136	926
C. Goos	119	138	148	166	194	155	920
R. C. Cole	179	140	171	124	147	152	913
Oakleigh Poultry Farm	167	142	160	140	142	154	905
O. Goos	153	127	164	172	157	127	900
R. C. J. Turner	162	138	165	155	156	120	896
Mrs. R. Hodge	180	118	149	135	181	127	890
H. Fraser	147	165	148	130	130	155	875

EGG-LAYING COMPETITION—*continued.*

DETAILS OF SINGLE HEN PENS—*continued.*

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS—*continued*							
F. Birchall	149	166	117	99	177	159	867
M. F. Newberry	147	125	118	177	134	158	859
J. W. Short	149	144	154	129	131	152	859
Mrs. E. White	157	77	172	116	152	169	843
Thos. Taylor	151	120	150	141	140	131	833
C. M. Pickering	167	163	107	136	141	119	833
E. A. Smith	125	126	143	143	125	130	792
HEAVY BREEDS.							
R. Burns	176	182	171	200	182	189	1,100
A. E. Walters	159	146	134	165	201	186	991
T. Hindley	137	156	109	201	204	137	944
C. C. Dennis	150	164	163	132	157	142	908
R. Holmes	118	175	156	145	142	158	894
E. F. Dennis	132	148	174	79	160	177	870
H. M. Chaille	152	152	165	130	159	103	861
J. Potter	135	137	132	139	143	104	790
Rev A. McAllister	133	141	151	91	65	156	737
Parisian Poultry Farm	88	122	145	91	138	144	728
J. E. Smith	65	108	79	71	92	116	531
Miss L. Hart	80	94	63	87	45	74	443

CUTHBERT POTTS, Principal.

"THE FERTILISERS ACT OF 1914" AND "THE FERTILISERS ACT AMENDMENT ACT OF 1916."

The attention of storekeepers, manufacturers, or other vendors of fertilisers is directed to the provisions of the Fertilisers Acts and Regulations set out hereunder.

Dealers' Licenses.

No person may sell any fertiliser unless he is licensed as a dealer under the Act. Any person who desires to become licensed as a dealer must apply in writing to the Minister for Agriculture, in the form prescribed by Schedule I., and remit therewith the prescribed fee of one guinea.

The license issued in the form of Schedule II. of the Act remains in force until the thirty-first day of December of the year in which it is issued. It may be renewed annually on payment of the prescribed fee of one guinea.

Certificate of Registration of Fertiliser.

On or before the thirty-first day of January in each year every licensed dealer must deliver to the Under Secretary, Department of Agriculture, Brisbane, a certificate in the form of the Third Schedule of the Act, setting out the specified ingredients of each brand of fertiliser sold by him. A copy of Schedule III. is enclosed.

Upon the sale of any fertiliser, whether paid for at the time or not, the dealer must at the time of sale, or before delivery of the same or any part thereof, give to the buyer an invoice certificate, in the form of Schedule IV., or to like effect, signed by the seller or his agents, and containing the particulars prescribed.

Invoice Certificate.

The invoice certificate should be in the following form:—

SCHEDULE IV.

"The Fertilisers Acts of 1914-1916."

INVOICE CERTIFICATE.

I [*here insert name and address of licensed dealer*], in the State of Queensland, licensed dealer under the "*Fertilisers Acts of* 1914-1916," hereby certify that the fertiliser this day sold (consigned or forwarded, or as the case may be) by me to [*here insert name and address of buyer*], being a quantity of tons cwt. qr. lb., is known as [*here insert name of fertiliser*], and is marked with the figure, or trade mark, or sign following, that is to say [*here insert trade mark or sign on bag*].

And I also certify that such fertiliser contains the following ingredients, in the proportion of the whole, set opposite thereto, in the form hereunder:—

Nitrogen, per centum, as nitrate.*
Nitrogen, per centum, as ammonium sulphate.
Nitrogen, per centum, as blood.
Nitrogen, per centum, as flesh and offal.
Nitrogen, per centum, as bone nitrogen.
Nitrogen, per centum, unspecified.
Phosphoric Acid, per centum, as water soluble phosphoric acid.
Phosphoric Acid, per centum, as citrate soluble phosphoric acid.
Phosphoric Acid, per centum, as citrate insoluble phosphoric acid.
Phosphoric Acid, per centum, total phosphoric acid.
Potash, per centum, as potassium sulphate.
Potash, per centum, as potassium chloride.
Potash, per centum, insoluble and unspecified.
Fine material, per centum.†
Coarse material, per centum.†

In the case of excrement of animals or any natural substance or natural product which is used for fertilising the soil, or supplying nutriments to plants, other than stable manure, seaweed, or crude nightsoil, the average analysis is as under:—

Nitrogen, per centum. Phosphoric acid, per centum. Potash, per centum.

In the case of lime for fertilising purposes:—

(*a*) Caustic lime, or burnt lime, or quick lime—
Calcium oxide (CaO), per centum.

(*b*) Mild lime, or air-slaked lime‡—
Hydrate of lime ($Ca(OH)_2$), per centum.
Lime carbonate ($CaCO_3$) per centum.

(*c*) Agricultural lime‡—
Lime carbonate ($CaCO_3$), per centum.

(*d*) Gypsum‡—
Lime sulphate ($CaSO_4$), per centum.
Fine material, per centum.‡
Coarse material, per centum.‡

In the case of ashes, or wood ashes:—

Potash, per centum. Phosphoric acid, per centum. Lime (CaO), per centum.

Dated at , this day of , 192 .

[Signature of dealer or his agent.]

---

* Here state whether in form of sodium, or potassium, or lime nitrate.

† In the case of bonedust and bonemeals, the percentage of fine and coarse material to be stated—fine to signify the particles smaller than one-fiftieth of an inch, and coarse larger than one-fiftieth of an inch.

In the case of basic slag, or Thomas phosphate, the percentage of fine and coarse material to be stated—fine to signify particles smaller than one-hundredth of an inch, and coarse larger than one-hundredth of an inch.

‡ In the case of air-slaked lime, agricultural lime, and gypsum, the percentage of fine and coarse material to be stated—fine to signify particles smaller than one-fortieth of an inch, and coarse larger than one-fortieth of an inch.

Printed Label to be attached to each Package.

Every dealer who sells (*see* definition of "Sale") any fertiliser must securely affix conspicuously to each package a *plainly printed label* clearly and truly certifying:—

(*a*) The number of net pounds of fertiliser in the package;

(*b*) The figure, trade mark, or other sign under which the fertiliser is sold;

(*c*) The chemical analysis, stating the percentage of nitrogen, phosphoric acid and potash, and the *forms* in which they respectively occur, and the percentage of fine and coarse material, etc., as required by Schedule III. and IV.

In the case of agricultural lime the percentage of coarse material and fine material must be stated on the label, together with the percentage of lime as CaO (calcium oxide) or $CaCO_3$ (lime carbonate); and in the case of gypsum the percentage of $CaSO_4$ (lime sulphate).

Sale.

"Sale" (with its derivatives) includes barter; also offering or attempting to sell, or manufacturing for sale, or importing or indenting, or receiving or introducing for sale, or having in possession for sale, or sending, consigning, forwarding, or delivering for sale, or causing or suffering or permitting or allowing to be sold or offered or exposed for sale.

Fertiliser.

A fertiliser is any substance or compound containing, in appreciable quantity, nitrogen, phosphoric acid, potash, or lime, manufactured, produced, or prepared in any manner for fertilising the soil or supplying nutriment to plants; also any excrement of animals or any natural substance, or natural product which is used for fertilising the soil or supplying nutriment to plants. The term does not include farmyard manure, stable manure, seaweed, or crude nightsoil, but any other crude product, or offal, whether specially treated or not, is a fertiliser within the meaning of the Acts if sold for the purposes of fertilising the soil.

Prices "Unit Value."

"Unit Value" means the cost of one per cent. by weight of the fertilising constituent in one ton of fertiliser. The unit values are fixed by the Commissioner of Prices, and give the maximum prices that may be charged by licensed dealers in fertilisers. The prices are based on registered analysis or certified actual analysis, provided that the containers are labelled as to analysis, etc., and the fertilisers invoiced in accordance with the Queensland Fertilisers Acts of 1914-1916.

All licensed dealers should make themselves fully acquainted with the unit values so fixed, and particular attention is directed to Prices Notification No. 386, which appeared in the *Government Gazette* of 7th October, 1922, in which will be found definitions of "fine," "coarse," "unspecified," etc.; also to Prices Notification No. 396 (*Government Gazette* of 4th November, 1922).

Dealers to Note.

It is to be noted that every person who intends to offer for sale, or sell, any fertiliser, must, before doing so—

Obtain a license from the Department of Agriculture;

Send a certificate of registration to the Department for each kind of fertiliser that it is proposed to sell;

Attach a printed label to each package, giving the required particulars; and

On a sale, give the buyer an invoice certificate as required by Schedule IV.

The invoice certificate given to the buyer, and the label attached to each package, must agree with the certificate of registration sent to the Department of Agriculture.

Forms of Registration (Schedule III.) or any other particulars, may be obtained from

THE UNDER SECRETARY,
Department of Agriculture and Stock,
Brisbane.

SHOW DATES FOR 1923.

Stanthorpe: 7th to 9th February.
Warwick: 13th, 14th, and 15th February.
Allora. 20th and 21st February.
Clifton: 28th February and 1st March.
Goombungee: 22nd March.
Herberton: 2nd and 3rd April.
Pittsworth: 4th April.
Chinchilla: 10th and 11th April.
Goondiwindi: 10th and 11th April.
Killarney: 11th and 12th April.
Esk: 11th and 12th April.
Toowoomba: 17th and 19th April.
Kingaroy: 26th and 27th April.
Maleny: 26th and 27th April.
Miriam Vale: 26th and 27th April.
Dalby: 2nd and 3rd May.
Toogoolawah: 3rd and 4th May.
Nanango: 3rd and 4th May.
Boonah: 9th and 10th May.
Wondai: 10th and 11th May.
Roma: 15th and 16th May.
Murgon: 17th and 18th May.
Wallumbilla: 22nd and 23rd May.
Ipswich: 23rd and 24th May.
Kilkivan. 23rd and 24th May.
Beaudesert. 29th and 30th May.
Marburg: 2nd to 4th June.
Mackay: 4th and 7th June.
Woombye: 20th and 21st June.
Lowood: 22nd and 23rd June.
Rockhampton: 21st to 23rd June.
Kilcoy: 28th and 29th June.
Woodford: 11th and 12th July.
Wellington Point: 14th July.
Caboolture: 19th and 20th July.
Mount Gravatt: 21st July.
Barcaldine: 24th and 25th July.
Rosewood: 25th and 26th July.
Pine Rivers: 27th and 28th July.
Sandgate: 3rd and 4th August.
Brisbane Royal National: 6th to 11th August.
Wynnum: 31st August and 1st September.
Zillmere: 8th September.
Laidley: 13th and 14th September.
Beenleigh: 20th and 21st September.
Kenilworth: 4th October.
Ascot: 24th October.
Pomona: 21st and 22nd November.
Millaa Millaa: 23rd and 24th November.

Event and Comment.

A Timely Defence of Australian Scientists.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) has received the following memorandum from the Director of Fruit Culture (Mr. A. H. Benson, M.R.A.C.) in relation to the several paragraphs that have appeared in the Press commenting upon alleged inaction of the Department in relation to the investigation and prevention of diseases in fruit, and making comparison with the methods adopted in America, a country with a population of about 118,000,000:—

"Judging from the letters and paragraphs that appear from time to time in the public Press, one would be inclined to believe that the only part of the world in which anything is known regarding fruit and other pests is the United States of America, and that as far as Australia is concerned, there is no one competent to give advice on these matters. This is decidedly unfair to the many able men who have devoted years of study to these matters under Australian conditions, and who have met with many successes as well as certain failures.

"In these respects they compare more than favourably with their American confreres, as it does not seem to be known by the general public that diseases, such as the Pear Blight, Peach Rosette, Peach Yellows, Citrus Canker, the Boll Weevil of cotton, the Pink Boll Worm, to say nothing of the Gipsy Moth which has destroyed countless millions worth of timber, have been investigated not only by the scientists attached to the Department of Agriculture in Washington, but also by those employed by the several States of the Union. For many years past these scientists have worked without any appreciable results, as they are little further forward now with respect to the treatment of these pests than they were many years since, despite the fact that money in practically unlimited quantity has been available for carrying out the necessary research.

"Pear Blight and Peach Yellows have alone totally destroyed areas of fruit that would cover many times the whole area under fruit in Queensland. Of the Boll Weevil in cotton, the destruction caused by it is so immense that its effect has become one of world-wide discussion. Similar histories in varying degrees apply to the other diseases mentioned, to which several others might be added.

"If, therefore, success has not been achieved under such favourable conditions, it is certainly not fair to blame those in Australia who have been responsible for instructing agriculturists and horticulturists regarding the destruction of the various pests attacking their fields or orchards because they have failed to find absolute remedies for pests such as fruit flies, insects which the best brains in all parts of the world have hitherto failed to deal with effectively."

The Sunspot Minimum and Jensen's Theory.

Dr. Jensen's theory of the inter-relation between sunspots and terrestrial disburbances was commented on in the October "Journal's" reference to the solar eclipse. The recent phenomenon, it was stated, had clearly demonstrated that we were approaching a sunspot minimum, which in its turn raised the question whether the earth's climate and such phenomena as earthquakes, volcanic eruptions, and droughts were influenced or not by sunspot conditions. Since that article was published, the cables have informed us of an earthquake in Chili, which destroyed several towns, a tidal wave following the shock which rendered thousands homeless, whilst particulars came to hand only a few days ago of another terrestrial disturbance in Japan, which destroyed four villages in the vicinity of Nagasaki.—"Queensland Government Mining Journal."

The Meston Mangosteen—An American Inquiry.

To comply with a request from the United States Department of Agriculture an ascent of the Bellenden-Ker Ranges to obtain specimen plants from these high altitudes of the delicious Queensland fruit, Meston mangosteen, will be undertaken shortly by Messrs. C. T. White (Queensland Government Botanist) and E. W. Bick (Curator of the Botanic Gardens). The United States Department desires the specimens, in fact both seeds and plants, in order to try the fruit out in the various sub-tropical stations in Florida and Hawaii. The ordinary mangosteen can be grown almost anywhere, but the Meston variety is purely sub-tropical and has thrived in Java, Singapore, and in similar climates. The American experts anticipate that specimens obtained from the high altitudes of Northern Queensland will do well for hybridising purposes, or as a stock at the ordinary sub-tropical experimental stations.

Night Harvesting by Electric Light.

Officers of the Victorian Agricultural Department have expressed interest in the report of the farmer in the Albury district who successfully harvested a large portion of his crop at night by the aid of electric lights attached to the harvester.

Several considered that this was the forerunner of the general adoption of electricity for work in the field. The extension of the Morwell system to the country districts, they said, would do much to hasten the application of electricity to the work of the farm. There were many occasions, one officer observed, on which hasty gathering of the crop was essential if it was to be saved, and the possibility of working at night would mean the difference between success and failure. When heavy winds were imminent early harvesting would prevent loss from the grain "shaking out." With wheat as 5s. per bushel, this loss usually represented a considerable sum. Definite proof of the advantage to be expected from night harvesting was given at the Government farm at Werribee. Hay from experimental plots, which had been stooked in the field owing to the limitation of time for carting in was carried by the high winds on to the adjoining farm, and the sheaves were so intermixed that the manurial tests for oats were seriously affected.

Rural Credit—A South African Measure.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) is giving close consideration to the question of rural credit and is in touch with the South African Government regarding recent Union legislation on the subject. The full text of the South African Act is now to hand. It is entitled "An Act to provide for the formation, registration, and management of co-operative agricultural societies with unlimited liability, co-operative agricultural companies with limited liability, and co-operative trading societies with limited liability" and marks an important advance in rural finance. It provides for the formation of associations in conformity with the ideas set out in the title with the objects of (*a*) disposing of the agricultural products or livestock of members in the most profitable manner; and (*b*) manufacturing or treating the agricultural or livestock products of members and disposing of the products so manufactured or partly manufactured in the most profitable manner.

Other objects include the purchase and supply co-operatively of implements and all farming requisites; the manufacture or treatment of farming requisites, including manures; to purchase and to work on behalf of members implements and machinery; to purchase and control breeding stock; to carry on supply stores under the co-operative system; to provide for cold storage; to carry on crop, produce, or livestock insurance, orchard spraying or cleansing, fruit packing, ploughing, and other farming operations for members on a co-operative plan; to provide competent instruction and advice; to disseminate farming information; to disseminate information on the markets of the world, and on co-operation in general; to carry on banking and insurance business under a co-operative system; the formation of co-operative trading societies on a limited liability basis and similar societies on an unlimited liability basis.

A chapter of the Act sets out the liability of members and capital. The conditions of membership laid down for unlimited liability societies provide for all of its members to be jointly and severally liable for the payment of debts and obligations of the society. The liability of any member who resigns, dies, or is expelled ceases in respect of debts and obligations incurred after he ceases to be a member; and in all other respects as soon as the balance-sheet and profit and loss account of the society disclose a credit balance in favour of the society. No unlimited liability society formed under the Act is required to have any fixed capital. The funds necessary for the carrying on of the operations of such a society shall consist of (*a*) capital funds, including any loans raised by the society; and (*b*) revenue funds, including the reserve fund. No loan in excess of £100 shall be raised by any such society without the approval of at least two-thirds of the members present at a general meeting specially convened for the purpose, of which notice, stating full particulars, has been given and unless the board of directors has approved of the loan.

In many other respects the South African legislation is similar to enactments with the same objects of Canada, the United States, and New Zealand, and its provisions generally are worthy of the close study of all interested in the stabilisation of the agricultural industry.

Financing Farmers—New Zealand Legislation.

What may be described as a rural revolution is taking place to-day in most agricultural countries. Everywhere the importance of agriculture as a "key" industry is being realised by legislators and others concerned closely with agrarian affairs. The old methods of financing farmers have come under review and condemnation and now most progressive countries are devising means for meeting a demand for a more equitable system of rural credit. In Australia serious consideration is being given to several systems, and in this respect we have the advantage of the experience of European countries, the United States, and Canada, and now New Zealand. In Queensland particularly it is recognised that no scheme of rural organisation can be complete without some measure for placing rural credit on a more rational basis and all information that can possibly be obtained from countries in which various systems are operating is being gathered with a view to framing similar measures favourable to the Queensland farmer. New Zealand has passed recently a Rural Credit Associations Act to "make provision, by means of the establishment of rural credit associations, for affording financial assistance to farmers and rural workers," which will repay study.

The purpose of this Act is to afford statutory recognition to certain classes of societies established for the mutual benefit of their members, their primary object being the making of advances to their members, secured principally on chattel security. Under previous legislation—the Incorporated Societies Act—the registration and incorporation of a main or central society or association is permitted, and also the registration and incorporation of district or branch societies.

The Act provides that no association shall be registered unless its rules provide for the following matters:—The receipt of deposits, whether from members of the association or others; the payment of interest upon such deposits at rates fixed in accordance with the rules of the association; the authority to borrow additional moneys as may be required by the association; the lending of money (either in cash or by the issue of bonds charged on the assets of the association, and payable to bearer or to order) to members of the association for approved purposes and under fixed conditions; the carrying to a reserve fund of all profits arising from the operations of the association; the appointment of a management committee of the association and of a manager, who shall be the chairman of such committee.

Members of the association are made jointly and severally liable for the liabilities of the association. It is recognised that comparatively few members will be the owners of unencumbered land, and it is provided, therefore, that the liabilities constitute an equitable charge on the assets of the members, subject to encumbrances existing at the time of the incorporation of the society.

The purposes for which loans may be made to members are enumerated as follows:—The clearing, fencing, draining, and general improvement of land in the occupation of a member; the erection of buildings on any such land; the purchase of implements, stock, seed, plants, trees, and other things required in the occupation and use of land; the purchase of tools of trade; the payment of any mortgage, debt, or other liability of the member. Loans to any one member are limited to £500. Administration expenses are kept within bounds by a provision for the payment of one member only (secretary and treasurer), together with an annual allowance to the chairman of the management committee.

General Notes.

Pineapple Board Referendum.

In the course of the month a referendum was taken on the question of pooling the pineapple crop. A set of questions was submitted to all registered growers, with the result that a negative majority was recorded. Following are the details of voting:—

DETAILS OF VOTING.

District.	Question No. 1. Are you in favour of a Pineapple Board for all Pineapples?		Question No. 2. If not, are you in favour of a Board for Smooth Leaf Pineapples only?		Acreage on the All-Pineapple Pool.	
	Yes.	No.	Yes.	No.	Yes.	No.
Woombye District	30	126	37	122	170	644
Palmwoods District ..	48	34	42	37	201	163
Beerburrum District ..	166	48	135	44	882	214
Cleveland District	52	115	19	95	227	733
Brisbane and other Districts	33	62	12	34	140	300
	329	385	245	332	1,620	2,054

Tomato Pool Board.

Under the Primary Products Pools Act of 1922, tomatoes grown in the Stanthorpe district have been declared a commodity. A board consisting of the following members has been constituted in relation to it. The members are: Messrs. W. H. C. Laird, S. A. Mitchell, W. H. Passmore, M. E. Sewell, and A. E. Watts. Mr. W. H. Passmore has been appointed chairman of the board.

Instruction in Poultry Keeping.

The poultry instructor, Mr. John Beard, will be at Stanthorpe on 6th February, at Warwick on the 10th and again on the 17th, at Killarney on the 15th, at Allora on the 19th, at Toowoomba on the 22nd, and at Clifton on 27th February next. In the course of his stay in each centre Mr. Beard will endeavour to visit as many of the local poultry yards as possible, and he also hopes to give lectures on poultry breeding, such lectures to be free to the public.

Primary Products Pools Act—Issue of Regulations.

Regulations have been issued under the Primary Products Pools Act of 1922. These prescribe a form of application which is to be made when asking for an Order in Council for a pool. This application may be made by the Council of Agriculture, representative growers of the particular commodity concerned, or by an organisation representing growers of that commodity. The applicants, after asking for a commodity to be brought under the provisions of the Act and that a board be constituted for such commodity, must also specify the classes of persons who shall be deemed to be growers of the commodity; that is, they must define the class of persons who shall be entitled to vote in connection with the proposed board. For

instance, the definition may be in terms of the number of acres of the commodity grown by each person, or the number of fruit trees or animals he may have, as the case may be. A person who is not entitled to vote will not have his commodity handled by the proposed board. The application must also define the district or districts in which the board shall operate, and the number of members for the proposed board. The application may also include any other representations which it may be desired should be made to the Minister.

The regulations further provide for the taking of a referendum as to whether the pool asked for shall come into operation, and in the event of the referendum being in the affirmative, for the subsequent election of the board. In all voting by growers (which are corporations or in partnerships) each corporation or partnership shall have one vote only, and persons under the age of twenty-one years shall not be eligible to vote. The regulations also lay down the methods of procedure to be followed by boards at their meetings. Provision is made that a board must meet at least once a month, and that all questions dealt with at any meeting shall be decided by majority and by open voting. If a member refuses to vote his vote shall be counted for the negative. No member of a board shall vote in respect of any matter in which he has directly or indirectly any pecuniary interest, and every member who knowingly offends against this regulation shall be liable to a penalty not exceeding £100.

Power is given to the board to require every producer or authorised agent to supply the board with information respecting stocks of the commodity in question held at any time. Producers and agents must also furnish on demand any other information concerning contracts for sale, prices fixed by such contracts, and other matters relating thereto which the board may require for the purposes of administration.

Answers to Correspondents.

Worms in Chickens.

G.C.Y. (Elimbah)—

The Poultry Instructor, Mr. J. Beard, advises:—

1. All your young stock will be more or less infected with worms, the pale-looking ones being affected the most.

Treatment: Give 10 to 15 drops of oil of turpentine in a teaspoonful of warm castor oil, on an empty stomach; two hours afterwards give another teaspoonful of castor oil. The birds should be placed in a box with a wire bottom so that when they pass the worms the latter drop through and can be picked up and burned; otherwise the birds would devour them again. All food should be supplied in troughs, not on the ground.

Preventive: Add to each gallon of water 50 grains of sulphate of sodium and 10 grains of sulphate of iron. Keep up this treatment for two weeks.

2. This Department's poultry pamphlet is out of print, but a copy of the new edition will be forwarded to you as soon as same is received from the Government Printer.

Sudan Grass.

J.W.C. (Stanthorpe)—

The Director of Agriculture, Mr. H. Quodling, advises:—

A number of analyses have been carried out by the Agricultural Chemist to determine exactly at what stage sudan grass is poisonous. Up to the present it has been shown that the second growth of this plant apparently carried more of the poisonous principle. This fact has been borne out to some extent by the deaths of animals having access to young shoots which have sprung up after the first cutting of the plants. In one instance at Toowoomba the death of fourteen head of dairy cows occurred. Samples of the fodder were obtained and submitted to the Senior Analyst of this Department, who found one grain of hydrocyanic acid present per pound of green material. The conclusion formed after carrying out a large number of analytical tests is that sudan grass must be fed with caution—even the first growth—and that the safest time to feed is when the plant has come into head.

Less danger is to be anticipated when sudan grass is cut and allowed to wilt for, say, 36 hours before feeding out to stock.

Probably one of the safest remedies for sudan grass poisoning is copious drenches up to 3 or 4 quarts of molasses, but the affected animals must be treated promptly. The inference to be drawn from this fact is that when feeding green stuff of this or of a similar character, less danger is to be expected when molasses are mixed throughout the chaffed fodder.

Orchard Notes for February.

THE COAST DISTRICTS.

February in coastal Queensland is frequently a wet month, and, as the air is often heavy with moisture and very oppressive, plant growth of all kinds is rampant, and orchards and plantations are apt to get somewhat out of hand, as it is not always possible to keep weed growth in check by means of cultivation. At the same time, the excessive growth provides a large quantity of organic matter which, when it rots, tends to keep up the supply of humus in the soil, so that, although the property looks unkempt, the fruit-producing trees and plants are not suffering, and the land is eventually benefited. When the weed growth is excessive and there is a danger of the weeds seeding, it is a good plan to cut down the growth with a fern hook or brush scythe and allow it to remain on the ground and rot, as it will thereby prevent the soil from washing, and when the land is worked by horse power or chipped by hand it will be turned into the soil. This is about the most satisfactory way of dealing with excessive weed growth, especially in banana plantations, many of which are worked entirely by hand.

The main crop of smoothleaf pineapples will be ready for canning, and great care must be taken to see that the fruit is sent from the plantation to the cannery with the least possible delay and in the best possible condition. The only way in which the canners can build up a reputation for Queensland canned pineapples is for them to turn out nothing but a high-class article. To do this they must have good fruit, fresh, and in the best of condition.

The fruit should be about half-coloured, the flesh yellowish, not white, of good flavour, and the juice high in sugar content. Over-ripe fruit and under-ripe fruit are unfit for canning, as the former has lost its flavour and has become "winey," while the latter is deficient in colour, flavour, and sugar content.

For the 30 or 32 oz. can, fruit of not less than 5 in. in diameter is required, in order that the slices will fit the can, but smaller fruit, that must not be less than 4 in. or, better still, 4¼ in. in diameter, and cylindrical, not tapering, can be used for the 20-22 oz. can.

Bananas for shipment to the Southern States should on no account be allowed to become over-ripe before the bunches are cut; at the same time, the individual fruit should be well filled and not partly developed. If the fruit is over ripe it will not carry well, and is apt to reach its destination in an unsaleable condition.

Citrus orchards require careful attention, as there is frequently a heavy growth of water shoots, especially in trees that have recently been thinned out, and these must be removed. Where there are facilities for cyaniding, this is a good time to carry out the work, as fruit treated now will keep clean and free from scales till it is ready to market. Citrus trees can be planted now where the land has been properly prepared, and it is also a good time to plant most kinds of tropical fruit trees, as they transplant well at this period of the year.

A few late grapes and mangoes will ripen during the month and, in respect to the latter, it is very important to see that no fly-infested fruit is allowed to lie on the ground, but that it is gathered regularly and destroyed. Unless this is done, there is every probability of the early citrus fruits being attacked by flies bred out from the infested mangoes.

Strawberries can be planted towards the end of the month, and, if early-ripening fruit is desired, care must be taken to select the first runners from the parent plants, as these will fruit quicker than those formed later. The land for strawberries should be brought into a state of thorough tilth by being well and deeply worked. If available, a good dressing of well-rotted farmyard manure should be given, as well as a complete commercial fertiliser, as strawberries require plenty of food and pay well for extra care and attention.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

The marketing of later varieties of peaches and plums, and of mid-season varieties of apples and pears, as well as of table grapes, will fully occupy the attention of fruitgrowers in the Granite Belt, and the advice given in these notes for the two previous months, with regard to handling, grading, packing, and marketing, is again emphasised, as it is very bad policy to go to all the trouble of growing fruit and then, when it is ready to market, not to put it up in a manner that will attract buyers.

Extra trouble taken with fruit pays every time. Good fruit, evenly graded and honestly packed, will sell when ungraded and badly packed fruit is a drug on the market. Expenses connected with the marketing of fruit are now so high, owing to the increased cost of cases, freight, and selling charges, that it is folly to attempt to market rubbish.

During the early part of the month it will be necessary to keep a careful watch on the crop of late apples in order to see that they are not attacked by codlin moths. If there is the slightest indication of danger, a further spraying with arsenate of lead will be necessary, as the fruit that has previously escaped injury is usually that which suffers the most.

Fruit-fly must also be systematically fought wherever and whenever found, and no infested fruit must be allowed to lie about on the ground.

Grapes will be ready for market, and in the case of this fruit the greatest care in handling and packing is necessary. The fruit should never be packed wet, and, if possible, it is an excellent plan to let the stems wilt for a day at least, before packing. This tends to tighten the hold of the individual berries on the stem and thus prevent their falling off.

In the western districts, winemaking will be in progress. Here, again, care is necessary, as the better the condition in which the fruit can be brought to the press the better the chance of producing a high-class wine.

Where necessary, citrus trees should be given a good irrigation, as this will carry on the fruit till maturity, provided it is followed up by systematic cultivation so as to retain a sufficient supply of moisture in the soil.

Farm Notes for February.

Reference was made in last month's Notes to the necessity for early preparation of the soil for winter cereals, and to the adoption of a system of thorough cultivation in order to retain moisture in the subsoil for the use of crops intended to be raised during the season. The importance of the subject, and its bearing in relation to prospective crop yields, is made the excuse for this reiteration.

The excellent rains recently experienced should have a heartening effect on all farming operations, as a good season may now be reasonably expected.

Special attention should be given to increasing the area under lucerne (broadleaf Hunter River), wherever this valuable crop will grow. Its permanent nature warrants the preparation of a thorough tilth and seed bed, and the cleansing of the land, prior to sowing the seed, of all foreign growths likely to interfere with the establishment and progress of the crop. Late in March or early in April is a seasonable period to make the first sowing, providing all things are favourable to a good germination of seed.

Dairymen would be well advised to practise the raising of a continuity of fodder crops to meet the natural periods of grass shortage, and to keep up supplies of succulent fodder to maintain their milch cows in a state of production. Weather conditions, particularly the recent heavy and continuous rains, have interfered a great deal with farming operations. Although abundant supplies of grasses are in evidence, provision should be made for the inevitable period, at maturity, when these lose their succulence.

Many summer and autumn growing crops can still be planted for fodder and ensilage purposes. February also marks an important period as far as winter fodder crops are concerned, as the first sowings of both skinless and cape barley may be made at the latter end of the month in cool districts. Quick-growing crops of the former description suitable for coastal districts and localities, where early frosts are not expected, are Soudan grass, Japanese and French millet, white panicum, liberty millet, and similar kinds belonging to the Setaria family. Catch crops of Japanese and liberty millet may also be sown early in the month in cooler parts of the State, but the risk of early frosts has to be taken.

Maize and sorghums can still be planted as fodder and ensilage crops in coastal districts. In both coastal and inland areas, where dependence is placed largely on a bulky crop for cutting and feeding to milch cows in May and June, attention should be given to Planters' friend (so-called Imphee) and to Orange cane. These crops require well-worked and manured land; the practice of broadcasting seed for sowing at this particular season encourages not only a fine stalk but a denseness of growth, which in itself is sufficient to counteract to some extent the effect of frost.

In the majority of agricultural districts where two distinct planting seasons prevail, the present month is an excellent time for putting in potatoes. This crop responds to good treatment, and best results are obtainable on soils which have been previously well prepared. The selection of good "seed" and its treatment against the possible presence of spores of fungoid diseases is imperative. For this purpose a solution of one pint of formalin (40 per cent. strength) to 24 gallons of water should be made up, and the potatoes immersed for one hour immediately prior to planting the tubers. Bags and containers of all kinds should also be treated, as an additional precaution. "Irish blight" has wrought havoc at times in some districts, and can only be checked by adopting preventive measures and spraying the crops soon after the plants appear above the ground. Full particulars on the preparation of suitable mixtures for this purpose are obtainable on application to the Department of Agriculture, Brisbane.

Weeds of all kinds, which started into life under the recent favourable growing conditions, should be kept in check amongst growing crops; otherwise yields are likely to be seriously discounted. The younger the weeds the easier they are to destroy. Maize and other "hoed" crops will benefit by systematic cultivation. Where they are advanced, and the root system well developed, the cultivation should be as shallow as possible consistent with the work of weed destruction.

First sowings may now be made of swede and other field turnips. Drilling is preferable to broadcasting, so as to admit of horse-hoe cultivation between the drills, and the thinning out of the plants to suitable distances to allow for unrestricted development. Turnips respond to the application of superphosphate; 2 cwt. per acre is a fair average quantity to use when applied direct to the drills.

Where pig-raising is practised, land should be well manured and put into good tilth in anticipation of sowing rape, swedes, mangels, field cabbage, and field peas during March, April, and May.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1923.	JANUARY.		FEBRUARY.		MARCH.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	5·1	6·49	5·25	6·46	5·45	6·24
2	5·2	6·50	5·26	6·46	5·46	6·23
3	5·3	6·50	5·27	6·45	5·47	6·22
4	5·3	6·50	5·28	6·44	5·47	6·21
5	5·4	6·50	5·29	6·43	5·48	6·20
6	5·5	6·51	5·30	6·43	5·48	6·19
7	5·5	6 51	5·30	6·42	5 49	6·17
8	5·6	6·51	5·31	6·41	5·49	6·16
9	5·6	6·51	5·32	6 40	5·50	6·15
10	5·7	6·51	5·33	6·39	5·50	6·14
11	5·8	6·51	5 33	6·39	5·51	6·13
12	5·9	6·51	5·34	6·38	5·51	6·12
13	5·10	6·51	5·35	6·38	5·52	6·11
14	5·11	6·51	5·36	6·37	5·53	6·10
15	5·12	6·51	5·36	6·36	5·54	6·9
16	5·12	6 51	5 37	6·35	5·54	6·7
17	5·13	6·51	5·38	6·35	5·55	6·6
18	5·14	6 50	5·38	6·34	5·56	6·5
19	5·15	6·50	5·39	6·33	5·56	6·4
20	5·16	6·50	5·40	6·32	5·57	6·3
21	5·16	6·50	5·40	6·32	5·57	6·2
22	5·17	6 50	5·41	6·31	5·58	6·0
23	5·18	6·49	5·41	6·30	5·58	5·59
24	5·19	6·49	5·42	6·29	5·59	5·58
25	5·20	6·49	5·42	6·28	5·59	5·57
26	5·20	6·48	5·43	6·27	6·0	5·56
27	5·21	6·48	5·44	6·26	6 0	5·55
28	5·22	6·47	5·45	6·25	6 1	5·53
29	5·23	6·47	...	...	6·1	5·52
30	5·24	6·46	...	...	6·2	5·51
31	5·25	6·46	...	...	6·2	5·50

PHASES OF THE MOON, ECLIPSES, OCCULTATIONS, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania when "Summer" Time is not used.

3 Jan.	○	Full Moon	12 33 p.m.
10 „	☽	Last Quarter	10 55 a.m.
17 „	●	New Moon	12 41 p.m.
25 „	☾	First Quarter	1 59 p.m.

Perigee on 8th at 9.54 p.m.
Apogee on 23rd at 11.24 p.m.

On 3rd January at 9 a.m. the Earth will be in perihelion, its least distance from the Sun about 91,300,000 miles. Three days later Venus will be in perihelion, and will be about 17,000,000 miles further from the Earth than it was on 25th November when in perigee.

On 29th January Mercury will be passing to the west of the Sun about 4 degrees on its northern side.

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2 Feb.	○	Full Moon	1 53 a.m.
8 „	☽	Last Quarter	7 16 p.m.
16 „	●	New Moon	5 7 a.m.
24 „	☾	First Quarter	10 6 a.m.

Perigee on 4th at 5.18 p.m.
Apogee on 20th at 6.18 p.m.

On 4th February Venus, apparently on the western border of Sagittarius, will be at its greatest western elongation, about 47 degrees from the Sun. On the 6th, soon after sunset, Saturn will be occulted by the Moon when below the horizon, but about four hours later the Moon, Saturn, and Spica will be apparently near to one another low down in the east.

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3 Mar.	○	Full Moon	1 24 p.m.
10 „	☽	Last Quarter	4 31 a.m.
17 „	●	New Moon	10 51 p.m
26 „	☾	First Quarter	2 42 a.m.

Perigee on 4th at 8.48 p.m.
Apogee on 20th at 6.24 a.m.

The Moon will be partly eclipsed on the afternoon of 3rd March, and there will be an annular eclipse of the Sun on the 17th, but neither will be visible in Australia.

Saturn will be occulted by the Moon about 2 a.m. on 6th March, when apparently near to the bright star Spica in the constellation Virgo. This fine combination of celestial objects will be then high up in the sky, nearly overhead.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter, and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

QUEENSLAND AGRICULTURAL JOURNAL

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Event and Comment.

A Year of Achievement.

The year 1922 was remarkable for agricultural progress in Queensland so far as constructive and ameliorative legislation of far-ranging effect can be regarded as evidence of progress. The most important of a long list of agricultural measures designed expressly in the farmer's interest, and therefore the national interest, is the Primary Producers Organisation Act, which was foreshadowed by the Premier (Hon. E. G. Theodore) in pre-sessional addresses, and introduced and piloted through Parliament by the Minister for Agriculture and Stock (Hon. W. N. Gillies). This measure has placed under the control of the farmers of Queensland the machinery for their own industrial redemption, and the onus of making the best of a beneficent Act now rests upon them. Legislation is not an end; it is merely a means. There is no short cut to prosperity. We must plan our work and work our plan, and this applies particularly to rural organisation, and more particularly to the tasks confronting the farmers' councils called into being by the legislation of last year.

Babel or Pentecost.

By the time these words are read the ballot for the election of district representatives on the Council of Agriculture will have been taken. In a very striking message to the farmers of Queensland in our last issue, Mr. Gillies emphasised the importance of wise choice in the selection of councillors, and his hope that they would be chosen from men of breadth of mind, honesty, sincerity, ability, stability, and firm faith in the scheme upon which last year's great forward movement was founded was no doubt echoed in the mind of every earnest farmer. On the elected leaders of the movement now depends the future of the farming industry; on them now depends the issue as to whether farmers will arrive at the day of Pentecost or slip back to Babel.

Unity of Purpose and Action.

As has been observed more than once in these columns, there can be little orderly building in an industry unless those concerned unite in thought, purpose, and action. There must be an idea, in the sense of vision, of larger results and better conditions common to the greatest number. The Government has provided plans, specifications,

and layout of a great rural development in Queensland, but the farmers themselves must do the building. The hope of prosperity by ballot is more or less an illusion; there is only one formula that can directly apply to rural organisation, as with our daily aspirations and ordinary avocations, and that is the age-old, four-lettered formula called work.

Necessity Compels Co-operation.

The remarkable preliminary success of the Queensland Producers' Association, incorporated under the Act referred to, is evidence that the Queensland farmer has readjusted his point of view to focus the effects modern social and economic changes are having upon his industry. Necessity has compelled him to affiliate with his fellow farmers in fairness to them and to himself. The pinch of hard times and marketing problems, the futility of solo fighting of trade combinations, both on the buying and selling sides, transport difficulties, and excessive operation costs are the main forcing factors in the general forward move towards wider and wiser co-operation. The pressure of need is one of the primary principles of joint action. Another is combination on a broad, constructive, sound, economic basis now made possible in Queensland by the Primary Producers Organisation Act.

Brains versus Brains.

The sound business way is the only way. No new commercial venture can expect to escape the fierce competition of existing enterprises, directed by keen brains, with which it will inevitably be beset. Brains must be met with brains, and no co-operative concern can expect a full measure of success unless based on modern business principles and economically conducted. This applies to what may be described as the front line activities of the Queensland Producers' Association. The creation of efficient farmers' marketing organisations, as provided for in its incorporating Act, must naturally incur the hostility of interests already entrenched. It is an army axiom, amply proven in practice, that the best defence is offence. A passive or negative attitude is the worst weapon in war. Farmers can only win a fair deal for themselves and their fellows by adopting a positive policy, by planning intelligently and performing effectively the organisation of the selling end of their enterprise.

The Selling End.

After sugar, the dairying industry is Queensland's most important source of agricultural income. Approximately £8,000,000 sterling is the annual value of dairy products to this State. While the question of increased production must be ever before us, it is obvious that no less attention must be paid to the marketing end of the business. In fact, under existing conditions the twin problems of marketing and distribution demand more and immediate attention from those to whom is committed the task of directing rural industries, from the executives of individual co-operative concerns to the men charged with making the Queensland Producers' Association the driving, pulsating force its progenitors conceived. In the current PRODUCERS' REVIEW is set out succinctly the advantage of intelligent organisation at the selling end of one branch of the agricultural industry alone, and which applies equally to other sections. As a result of effective control Queensland dairymen received an additional £200,000 over Southern prices for their produce in twelve months. The REVIEW comment is worth quoting:—

"In this State dairymen are organised more effectively, and as a result of that organisation the prices of local sales have been fixed by a body representative of the dairymen—the Queensland Butter Pool. The personnel of the pool, whose work has not been appreciated at its full value, is as follows:—Messrs. J. Purcell (chairman), T. Flood Plunkett (Logan and Albert), H. M. Stevens (Queensland Farmers'), F. J. Dobson (Caboolture), W. Stephens (Southern Queensland), W. T. Harris (secretary Co-operative Dairy Companies' Association). These gentlemen have capably handled a difficult situation, and, despite repeated efforts by importers of Victorian butter to break the local market, have maintained a price higher than that ruling in the South.

"At time of writing, the wholesale prices in the three chief butter-producing States are as follows:—

	s.	d.	
Queensland	186	8	per cwt.
New South Wales	168	0	„
Victoria	154	0	„

(At one stage the Victorian price touched 144s.)

"If it had not been for attempts by importers to break the market, the local price would have been at least 2d. per lb. more. Failure to obtain that extra 2d. has meant during the last four months a weekly loss to Queensland dairymen of £2,500.

"But what would the loss have been if the market had been broken, and prices had fallen to the Victorian level?

"*From 1st October, 1921, to 30th September, 1922, Queensland dairymen received £200,000 more than they would have received if Victorian prices had ruled here.*"

The Teaching of History.

The Producers' Review is worth quoting again—

"The teaching of all history is that the farmer can never—in fact, no one can ever—prosper as a mere producer of raw materials.

"The men who dig coal live in huts; the men who handle it in fine houses. The men who grow sugar-cane live humbly; those who control the distribution live prosperously. The agents live much more pretentiously than the dairymen whose butter they sell. And so the list could be lengthened indefinitely.

"Wherefore the farmer is fighting to-day for a larger share of the wealth that he creates. He is fighting to be something more than a producer of raw materials. He is fighting to get and keep for himself the profits that come from handling and distributing—and wiser handling and distributing—of the products of his toil. He is fighting to bring about a realisation of the prophecy uttered nearly 3,000 years ago—

> 'They shall build houses and inhabit them; and they shall plant vineyards and eat the fruit of them. They shall not build and another inhabit; they shall not plant and another eat.'

"The farmer who does not fight with his brother farmers in their effort to 'make themselves masters of their own industry' is hindering them and hurting their cause. The interests that are fighting to keep the farmer 'a mere producer of raw materials' are wealthy and powerful, but the farmers have only to stand together in order to win. And all must stand together. The present chaotic conditions are due to lack of organisation in the past. The Queensland Producers' Association provides the organisation for the future, and those in control must have the ability to evolve from the present chaotic conditions a system which will ensure to the producer a proper share of the fruits of his labour."

Obstinate Apathy.

The Queensland Producers' Association is rapidly getting into its stride and should soon straddle the rut of obstinate apathy so evident in some restricted rural circles. Among some farmers there is apparently a tendency to drift—a weak sliding backwards into the sapless dreariness of a fatalistic "What's the good," that extraordinary mental attitude with which so many regard every move towards industrial betterment. The Association offers the means of promoting co-operation on the widest possible scale, not only among farmers, but between them and other sections of the community whose interests are identical or parallel. The possibilities of the State-wide plan have been fully demonstrated, but one of the minor problems of organisation is the indifference of some concerned directly in its success. In such cases, doubtlessly, indifference is due to lack of thought, and vigorous organisation will help to round up the stragglers. To properly develop the great agricultural industry every primary producing unit in the State must be welded into one solid organisation. Farmers individually have everything to gain by making the Association as strong as possible.

QUEENSLAND AGRICULTURE IN 1922.

BY H. C. QUODLING, Director of Agriculture.

Subjoined is the full text of the report of the Director of Agriculture (Mr. H. C. Quodling) taken from the Annual Report of the Under Secretary, Department of Agriculture and Stock (Mr. Ernest G. E. Scriven), to the Minister (Hon. W. N. Gillies) for submission to Parliament.

COTTON.

An Encouraging Outlook.

The outlook generally from an agricultural standpoint is most encouraging. The most striking feature witnessed during the year was the very live interest taken in cotton, a crop apparently destined to play a most important part in land settlement. Figures shown elsewhere in the Department's report help to bear this out. These, however, do not present a true indication of what the future holds in store. What actually counts, and can be relied upon to provide a most encouraging perspective and more accurate indication of what may be termed "the pulse" of the industry, is the extraordinary number of inquiries being made through the Department respecting cotton, and the desire generally expressed by persons of settling in the State if facilities are forthcoming. Hitherto, no better opportunity has presented itself of settling large areas of Crown lands in the cotton belt.

At this stage of the resuscitation of an industry, ripe for development under a guarantee price, with the certain prospect of up-to-date ginning establishments already at hand or in prospect for the treatment of the crop, a note of warning should be struck respecting the prevailing idea amongst growers that little else matters on the farm as long as an extensive area of cotton can be put in.

Obviously, the farmer who has the necessary family labour available is the better equipped man for cotton-growing than the one who employs labour. Observation goes to prove that the tendency, in some instances, is to put more land under cotton than can be properly cared for, to the detriment of other branches of farming, dairying, and pig-raising, which might also be reasonably carried out on the same farm.

Quality of Queensland Cotton.

The excellent reports received through the British Cotton Growing Association on the quality of last year's cotton, over 1,000 bales, proved most encouraging, and the average length of fibre—$1\frac{1}{8}$ inches—placed the Queensland article in the long-staple Upland class, which alone is sufficient indication of its quality. It was shown, however, that with a greater uniformity in character and length of staple much better results were attainable. With this objective in view the Department established several seed propagation areas (in temporary quarantine) with seed obtained through the Agent-General, and the Australian Cotton Growing Association also. The cotton-growing on one quarantine area developed a bacterial leaf disease and was destroyed by order of the Chief Quarantine Officer for Queensland. A second area showed traces of the same trouble and is under close observation, with the prospect of the crop being dealt with summarily also. Three other plots at Capella, Charters Towers, and Cooktown made satisfactory development. Seed selection work is in hand in connection with the latter plots, and it is satisfactory to note that every prospect exists of obtaining a sufficiency of seed for about 300 acres for planting in the spring of this year, and if no untoward circumstance obtrudes itself, ample supplies of improved seed should be available to meet all requirements in 1924. In this way there is every prospect of producing a uniform type of cotton with a staple probably reaching $1\frac{1}{4}$ inch in length. Substitution of a variety of cotton of this quality even for the present class of cotton, which is admittedly good, must enhance the value of the State's output in a marked degree.

MAIZE.

The Northern Crop.

The season generally was not as satisfactory as it might have been, although the crops were all that could be desired in certain districts favoured by regular rains during the growing season. Less maize than usual was planted on the Atherton Tableland. The quantity of grain carried over from the previous year was large and the quality indifferent, on account of an exceptionally wet season, and these facts militated against the utilisation of available lands, some of which were devoted to dairying instead. Although Townsville and the Northern markets were open, there was little prospect of competing successfully in the more Southern markets on account of high transport charges. As a result the 1921-22 crop on the Tableland is not expected to exceed 7,000 tons. Although the district's average yield is comparable with the highest obtainable elsewhere, the wet season ceased earlier than usual and the precipitation proved to be slightly below the average.

Lower Southern Yields.

In the main maizegrowing districts in Southern Queensland the summer rains were not so plentiful as in the previous year; this caused curtailment of output.

Seed Improvement.

Good and substantial progress was made with the departmental scheme of seed maize improvement. Fresh importations of grain were made from the United States of America to supplement the varieties now in cultivation. The technical work associated with seed selection and the production of high yielding strains of grain has been placed in the hands of Mr. C. McKeon, Assistant Instructor in Agriculture, whose efforts in segregating and propagating some choice varieties are meeting with success. Thirty plots, aggregating 91½ acres in area, were established in the following localities:—Tingoora, Murgon, Manyung, Goomeri, Imbil, Kilcoy, Yandina, Boonah, Beaudesert, and Marburg.

The practice of selecting grain from the field propagation plots was continued for the purpose of providing seed for sale to farmers; in this way tangible results should be forthcoming and the returns from individual farms increased.

Three useful varieties have been added to those commonly grown by an importation of seed from the United States of America, viz., Funk's Ninety-day, Funk's Yellow Dent, and Eureka. In summarising the results of the season's trials, Mr. C. McKeon, the maize specialist, stated as follows:—

> "The Funk's Ninety-day gave easily the best results of the imported varieties with a yield of 55 bushels per acre. The type proved to be very even and the variety a heavy yielder."

Other results obtained from departmental seed were generally most encouraging and afford evidence that careful selection of high-yielding strains is calculated to improve the standard and aggregate yield of grain in the State.

An extension of the remarks to the latter varieties is as follows:—

> "Reid's Yellow Dent returned 70 bushels per acre. The crop at Kilcoy (a four-months one) attracted much attention. Cobs were exceptionally large, with a good depth and type of grain. Husk covering showed a decided improvement. Cobs were carried very low on the stalk and turned down well during ripening.
>
> "Golden Beauty Maize, a five-months corn, grown also in the Kilcoy district, returned 85 bushels per acre. This variety gave very fine results. It was raised from seed selected from low-bearing plants, and the improvement in the position of ear was very marked. Type of grain good, and husk covering very good."

Improved Yellow Dent grown at Bunjurgen, near Boonah, averaged 90 bushels per acre—

> "An exceptionally fine crop. Weather conditions throughout were very favourable. Cobs were very large and of splendid type. Plants were spaced 2 feet apart in the rows, which probably accounts for the extra development of the ears and grain. Easily the best crop of the season."

To encourage the production of specified types of grain, arrangements were made with the Royal National Agricultural Association to revise their schedule for maize.

The work designed for the purpose of determining the amount of moisture in Atherton-grown maize—in the field, barn, bag, and tank—has been consistently followed up and some useful information compiled. Mr. Field-Assistant Wise, who has been engaged in the compilation of data, is following up the matter of moisture content of marketed grain to complete a series of tests.

WHEAT.

Better Grain.

Although the aggregate yield proved to be somewhat less than last year, the quality of grain was better; in fact, only a small percentage proved to be under f.a.q. standard. Results of this character compare more than favourably with the best wheat-producing States in the Commonwealth.

The Wheat Board's operations were facilitated in no small degree by having grain of this excellent description to handle. Overseas shipment of grain was continued by the Board, and Queensland wheat has been well received by the trade.

Co-ordination of Activities.

The co-ordination of activities of the Department and the Wheat Board, for the betterment of the industry, was arranged in time for the present planting season, and put into practice. All available stud seed from State farms and field propagation plots was placed with approved growers, whose land was first inspected by a member of the Board in company with an officer of the Department. The reduction aimed at in the number of varieties in cultivation—from about 70 to 22—is a first step towards the elimination of many unsatisfactory kinds. The outline of the scheme is appended:—

1. The Department of Agriculture to co-ordinate its wheat-breeding and wheat-testing work and to link it up with the activities of the Wheat Board.
2. The scientific and technical work necessary to give effect to the scheme to be carried out as at present by the Department of Agriculture, and when seed of improved varieties recommended by the Department is available from time to time in sufficient quantities, the Board to take it over by purchase (at a price to be mutually agreed upon at the time) and make arrangements for sowing the respective varieties in localities and on picked areas recommended by the Department as suitable for the purpose of propagating supplies of the several kinds.
3. The Board, in sequence, to secure seed from these sources, rail it to its central depôt for cleaning, fumigation, grading, and storage, for ultimate despatch to the localities decided upon for the commercial propagation of specified types of wheat.
4. For the purposes of the successful working of the scheme, and of the production of standard types of grain, the State to be classified into districts or zones, so that efforts may be directed towards the growing of suitable types and varieties within each for delivery to, and subsequent distribution by, the Board. In this way it would be possible to draw upon certain classes of grain for milling or export, as may be required.
5. That a classification be made of varieties now in cultivation, with a view to the discarding of those which are undesirable or unsuitable for Queensland conditions, or which are of soft, starchy, poor milling, or indifferent keeping qualities.
6. That the Board take the necessary steps to further this latter object by ensuring the delivery by the grower of all wheat to the Board which comes under this latter category. In this way, the usual reservations or arrangements for next season's seed by the grower will be brought into line with the policy of standardisation, as the approved wheats can then be supplied in lieu thereof.
7. That for the purpose of ensuring the preservation of supplies of pure seed of varieties finally approved of under the scheme, the Department to continue the work of seed selection by maintaining small nursery plots at its wheat-breeding or on other farms, with the object also of the improvement by selection, and the maintenance of certain strains within the respective varieties, which could be drawn upon should the identity or purity to type of the original varieties require to be renewed at any time.
8. That seedsmen dealing in seed wheat be furnished with an outline of the scheme in order to secure their active co-operation in effecting its aims and objects by placing varieties purchased from the Board, or other sources, with growers in districts or zones to which such varieties have been allotted.

Field Tests and Trials.

The officer deputed to carry on last season's field tests and wheat trials, Mr. C. S. Clydesdale, Assistant Instructor in Agriculture, reported good progress in all operations. Work of this character, dependent as it is on the highly technical and skilled efforts of the manager of the Roma State farm in breeding up and selecting new types of wheat, is demonstrating in a marked degree that Queensland's requirements are being catered for and successfully met. Farmers are showing a greater interest in this class of experiment work than formerly, which is tangible evidence that its importance is recognised.

Ten varieties of wheat, produced at the Roma State farm, were tested at different centres—Allora, Jandowae, Bell, and Inglewood—under field conditions, the plots aggregating 46½ acres in area, the highest yield being recorded at Inglewood with "Cedric," 30 bushels per acre.

The comparative trials of over 130 varieties of wheat, principally new crossbreds, admitted of the selection of a limited number exhibiting improved field characteristics and ability to resist rust; and these latter have in turn been sown again this season

in larger areas to admit of extension trials under field conditions. This gradual process of evolution is calculated to furnish further evidence of the fitness or otherwise of the varieties for general cultivation, providing that the imprimatur of the chemist and miller is received.

Wheat taken from one of the Department's seed propagation plots proved to be of good quality, and when exhibited by the grower at Toowoomba was only beaten by .5 in a strong competitive class.

Prospects Promising.

Touching the question of the industry generally, matters appear to be promising, as the area put under crop and in course of preparation for planting should show an increase on last year's figures.

Good rains fell during the month of June, and expectations of suitable conditions for germination were realised.

Arrangements have been made by the Wheat Board for increased storage accommodation at several railway centres, which will go a long way towards the removal of disabilities in this direction.

Barley.

The growing of malting barley (once a specialised industry) appears to have its limitations, due to the restricted local demand by brewers. The generally accepted opinion is that Queensland is capable of producing large quantities of first-class barley if a profitable market could be found. Last year's crop was ravaged in some localities by the so-called "army worm," which occasioned damage.

Darling Downs farmers, many of whom are dairying in conjunction with crop raising, are paying attention to the growing of cape and skinless barley as a fodder crop for grazing off, with good results.

Canary Seed.

Canary seed growers, who harvested good crops, found themselves restricted in a marked degree in the matter of a payable price and an indifferent demand for their product, so decided to form a "pool" in order to regulate supplies and prices, but at the time of writing the price still remained low and the demand less active than formerly.

Lucerne.

Lucerne still holds pride of place in many districts where its cultivation is specialised in, but the excellence of the plant for cropping purposes calls for a wider recognition of its value on the average Queensland farm, it being generally recognised that if more lucerne were grown on dairy farms it would naturally follow that better results would be obtainable through the use of a protein-yielding food, an essential in milk production.

English Potatoes.

Of the varied assortment of crops grown (particulars concerning which are to be noted in the statistical returns), *English Potatoes* occupy an important position as a food crop. It is an anomaly to find that such a large quantity of potatoes still find their way here from Southern States, a circumstance which means a big loss to Queensland growers.

Sweet Potatoes.

Facts made known concerning the quality and extraordinary yields (over 30 tons per acre) of potatoes obtained in the trials carried out by the Instructor in Agriculture at Rockhampton, Mr. G. B. Brooks, have focused attention on this crop, and it is significant that upwards of 10,000 cuttings were sent out last year from propagation plots, the distribution covering a wide range of country. Evidence of this character serves to indicate that growers recognise the importance of making the best use of their land for the production of maximum crops.

The pamphlet on "Sweet Potatoes," prepared by Mr. Brooks for publication (affording as it does a wealth of technical detail dealing with the classification of varieties), promises to provide a very useful and instructive addition to the printed matter on this subject.

Dairy and Pig Fodder Plots.

Reference was made in last year's report to the establishment of dairy fodder and pig fodder plots on the North and South Coasts respectively. The results generally were excellent, the season being an exceptionally favourable one. Returns of this character should be sufficiently convincing without further elaboration.

RESULTS OF DAIRY FODDER TRIALS.

Varieties.	YIELDS PER ACRE OF GREEN FODDER.											
	A. Hulse, Yandina.				F. G. Burton, Bridges.				J. B. Stephens, Nindooimbah.			
	Tons	cwt.	qr.	lb.	tons	cwt.	qr.	lb.	tons	cwt.	qr.	lb.
Prince wheat and peas ..	16	16	2	12	2	14	0	2	13	10	0	10
Prince wheat and vetches	10	16	0	8	6	1	2	4	11	17	2	20
Patriot wheat and peas ..	16	4	0	12	9	2	0	0	14	0	3	16
Patriot wheat and vetches	11	6	3	4	2	0	2	1	12	18	1	26
Rye and peas	10	16	0	8	5	5	1	9	14	11	2	22
Rye and vetches	7	11	1	0	Destroyed by wallabies				16	4	0	22
Cape barley and peas ..	12	3	0	9	10	16	0	8	13 (two cuttings)	10	0	10
Cape barley and vetches ..	7	11	1	0	2	19	1	19	15	2	2	0
Skinless barley and peas ..	11	6	3	14	Destroyed by wallabies				5	18	3	10
Skinless barley and vetches	5	13	1	21	Destroyed by wallabies				5	2	2	15
Ruakura oats and peas ..	9	9	0	7	4	3	2	25	18	18	0	14
Ruakura oats and vetches	7	11	1	0	Destroyed by wallabies				17	16	2	2
Algerian oats and peas ..	8	18	1	1	3	6	0	19	9	3	2	18
Algerian oats and vetches	6	15	0	5	Destroyed by wallabies				9	14	1	24

The yields generally on Mr. F. G. Burton's plots were reduced by the depredations of wallabies.

Seed sown 17th and 18th May on F. G. Burton's farm and on 26th and 27th May on A. Hulse's farm.

Rainfall taken at Yandina during period of growth of crop 20.71 inches—twenty-eight wet days.

Seed sown on J. B. Stephens's farm, 17th and 18th May.

Rainfall during period of growth of crops 18.93 inches—forty wet days.

RESULTS OF PIG FODDER TRIALS.

Varieties.	A. Hulse, Yandina, N.C.				F. G. Burton, Bridges, N.C.				J. B. Stephens, Nindooimbah.			
	Tons	cwt.	qr.	lb.	tons	cwt.	qr.	lb.	tons	cwt.	qr.	lb.
Yellow globe mangel ..	35	2	0	26	28	12	2	10	23	15	1	12
Long red mangel ..	33	17	0	19	52	13	1	11	24	6	0	18
Sugar beet	32	8	0	24	24	6	0	18	20	14	0	15
Silver beet	15	17	1	11	10	11	0	18	9	0	0	6
Scotch kale	9	9	0	7	No record				Not sown			
Dwarf Essex rape ..	16	4	0	12	16	4	0	12	10	5	2	24
Purple-top swede ..	24	6	0	18	51	17	0	16	13	10	0	10
Elephant swede ..	25	13	0	19	32	8	0	24	16	4	0	12
White Belgian carrot ..	11	12	1	3	No record				19	6	0	14
Large drumhead cabbage	27	10	3	26	No record				17	5	2	24

Seed sown on F. G. Burton's and J. B. Stephens's farms, 18th May. On the 25th May on A. Hulse's farm.

Rainfall 20.71 inches for Messrs. Burton and Hulse's farms (twenty-eight wet days), and 18.93 inches for J. B. Stephens's farm (forty wet days).

STATE FARMS.

Gindie.

Development work, directed towards the improvement of the property, including that of water supply, fencing, and of erection of yards, improvement to cattle dip, &c., has been carried on throughout the year and more efficient control attained. New cultivation areas were added to the existing ones.

Much preparatory work was given to the main cultivation areas to provide supplies of hay and ensilage for stud stock and working horses, and the extra cultivation resulted in exceptionally good crops of hay, wheaten yielding 2 tons per acre and oaten 30 cwt. Good weather was experienced for curing the crops. Approximately, 100 tons of maize were cut and chaffed into the silos.

The season generally was favourable (approximately 26 inches of rain) for the stud herd of shorthorns, and the young stock are very promising, but prices for young bulls for herd improvement have dropped in keeping with the present depression of the cattle industry. Three shows were attended during the year with teams of cattle to advertise the stock, and honours won throughout. At Rockhampton good competition had to be met, and the farm carried off the champion prize for bull with an animal bred on the place, beating last year's champion, an imported animal. Females also bred on the farm gained most of the prizes, although unsuccessful in the championship. The aim throughout to produce typical sires for sale to improve the quality of district herds is meeting with success. Three animals of our own breeding were put over the scales to determine whether the early maturing qualities claimed for the cattle had been realised; the weights bear this contention out. The champion bull—Gindie Duke of Beauford 2nd, 28½ months old—turned the scale at 1,834 lb., whilst two young cows in the fat stock section weighed 1,518 and 1,442 lb. respectively.

Kairi.

Development work in the way of falling an area of over 50 acres of scrub was undertaken. Maintenance of existing areas proved a heavy item, as undergrowth and weed-growths, forced into activity by a generous rainfall, had to be coped with. Stud stock (Jerseys and Illawarra shorthorns) have improved in numbers and quality, and the work of classification has entailed the testing of a large number of different samples of milk from individual animals in the herd. The dairying industry has assumed large proportions on the Tableland, and evidence goes to prove that herd testing is a work which cannot long be delayed.

An excellent demand has set in for cane sets from sugar districts below the range, it being recognised that the change of climate undergone on the highlands here by the varieties being grown to meet this demand will have an excellent effect and overcome disabilities which cane is subjected to when grown consistently under forcing climatic conditions on the coast.

The stud of Berkshire pigs has increased, and when matters were practically booming in this line in keeping with developments expected in the way of a co-operative factory, the demand for animals for breeding purposes was difficult to meet; as the factory proposition is not finalised, interest in this excellent side line to dairying has waned.

The purchase of a young Suffolk Punch stallion from the well-known Dangar stud in New South Wales has equipped the farm with a long-felt want.

Warren.

The season was not as satisfactory as it could have been, owing to the falls of rain being sporadic in character. Throughout the year effort has been directed towards putting the property on as efficient a basis as possible, and minor improvements were consistently directed towards this objective. Useful experiment work was engaged in and added interest shown in the farm operations. A feature which promises well from an educational standpoint is the instructional work to pupils of the local school, who are keen to acquire a knowledge of agriculture. Lectures and practical demonstration work have been combined. It is purposed to extend this class of instruction and co-operate with the head teacher of the school.

Arrowroot, grown on a 3-acre demonstration area, has proved itself a very valuable crop for providing large supplies of "bulbs" for pig-feeding purposes. Local farmers are interested, and the experiment is one of the most striking successes of the year's operations. It was also demonstrated that the ordinary dun field pea, when grown under field conditions, was another valuable crop to the district, the growth of the crop and the selling of a large amount of seed bearing this out.

The Ayrshire stud has been maintained in a state of efficiency and the young stock are promising. Berkshire pig breeding has proved a profitable line of work, and the animals from this farm are doing much towards improving the standard, both of breed and quality, of the district's pigs.

Hermitage.

The principal work of the year was directed towards the testing of a large number of different varieties of wheat, barley, and oats, both in the stud seed selection rows and in larger areas under field conditions. Co-operation was arranged in the comparative tests of over 130 Roma State farm crossbreds, and although sown rather late in the season, the results were conclusive in respect to the susceptibility of certain strains to rust, and more pronouncedly so regarding the quality looked for in carrying out the trials, *i.e.*, rust resistance. Comparisons drawn from these tests and of the field trials have shown that some varieties possess extraordinary powers of rust resistance. This elusive quality in the field characteristics of wheat has evidently been fixed. Seed supplies of some of these have been made available to farmers for the present season's sowing.

During the year the farm was used as a depôt for a quantity of seed wheat from demonstration plots carried out under the Field Branch of the Department, and the whole of the grading and despatch of the grain was undertaken.

The sheep kept on the farm have been improved by careful culling, and proved valuable in conjunction with the raising of wheat and other cereals.

Roma.

Wheat-breeding work, for which this farm was principally established, absorbs a good deal of time and attention, but the results of several years devoted to this all-absorbing subject are now manifest. Encouraging reports have been received of the several new varieties which have been brought into cultivation, and it is satisfactory to be able to record the fact that a distinct objective has been attained in the co-ordination of the technical work on the one hand, carried out in the evolution of new strains of wheat at this farm, with that of the demonstration plots conducted by the field branch of the department and the linking up of these several activities with those of the Wheat Board. Propagation of improved varieties of this character under conditions to insure purity of type, and their substitution for older and possibly inferior kinds, should have an excellent effect on the industry. Fertiliser trials carried on for a number of years, effecting, as they have done, some slight improvement in the yields of grain by the use of special mixtures, have not yet shown that fertilising will pay, unless the quantity of fertilisers applied can be reduced to a minimum.

AGRICULTURAL CHEMISTRY.

Valuable work has been carried out by the Agricultural Chemist in the milling of new crossbred wheats and in the testing of the nutritive qualities of the resultant flour. One feature of outstanding importance is the fact that Queensland-grown grain is equal in quality to grain grown in the other States, and, in a number of instances, it has shown out to advantage. This farm has participated in the comparative tests of Australian varieties carried out in conjunction with the Bureau of Science and Industry.

Another section of plant-breeding work taken up a few years ago, viz., that of the production of new varieties of grapes, is affording some excellent data.

A retrospective view of the year's work indicates that good progress has been made. My thanks are due to the whole-hearted and loyal efforts of the staff throughout the three divisions of the State—North, Central, and South.

THE QUEENSLAND DAIRYING INDUSTRY.

A YEAR'S REVIEW.

BY E. GRAHAM, Director of Dairying.

The following review of the dairying industry in Queensland is taken from the Annual Report of the Under Secretary, Department of Agriculture and Stock (Mr. Ernest G. E. Scriven), to the Minister for Agriculture and Stock (Hon. W. N. Gillies) for presentation to Parliament.

A feature of the season just terminated was the favourable weather conditions which prevailed throughout the spring, summer, and early autumn months, and changed adversely to dairying for the remaining portion of the year.

The lack of rain during March and April was responsible for a curtailment in the amount of green fodder usually available for dairy stock, and the customary feeding-off of the young crops of wheat by the dairy herds during the winter months in the Downs district did not take place. Dairy farmers in the coastal areas were unsuccessful in raising satisfactory crops of sorghums, imphee, &c., so generally utilised for winter feeding, because of the comparatively dry condition of the soil during the months when crops of this nature make much of their growth.

The comparative scarcity of fodder on the farms, coupled with a winter more severe than the average, resulted in a pronounced reduction in the milk yield, affecting in turn the complement of butter and cheese produced within the closing months of the season.

A New Record of Production.

Despite the foregoing unfavourable seasonal conditions, the amount of dairy foodstuffs produced within the year was in the aggregate considerably in excess of the quantity manufactured within the former year, and consequently a new record of production has been established in this State. Formerly, the high mark of butter production in Queensland was credited to the season 1920-21, but the production is higher this season. The following are the particulars of theproduction within the respective seasons:—

Season.	Amount Butter Production.
1920-21	40,751,373 lb.
1921-22	60,923,194 lb.
Increase for season 1921-22	20,171,821 lb.

No change occurred within the year to the uses to which the milk raised on the dairy farms was ultimately placed. The milk produced was utilised for domestic purposes and in the production of butter, cheese, or condensed milk, the production of butter claiming by far the larger proportion of the total amount of the milk raised.

Generally, the standard of quality of the dairy produce manufactured within the year was well maintained. A number of factories effected an improvement in the quality of the butter manufactured therein. Especially was this noticeable in the cases where pasteurisers were installed and the pasteurisation of the cream supply carried into operation.

Neutralisation and Pasteurisation.

It is calculated that at present at least 90 per cent. of the total amount of butter manufactured in this State is made from cream which has been subjected to neutralisation and pasteurisation prior to churning.

The few remaining companies which have so far refrained from adoption of pasteurisation of cream intend to install the necessary plant and carry the process into practice at their factories if it is found that any considerable percentage of their output of butter is being submitted for export overseas. It is anticipated that practically the whole of the butter intended for export during next season will be from churnings of cream to which pasteurisation has been applied.

Although the beneficial effects accruing to the quality and keeping properties of butter as a result of pasteurisation of the cream supplies are widely known and accepted by manufacturers, several experiments were carried out during the season for the purpose of testing the efficiency of pasteurisation towards arresting the deterioration in the quality of butter intended for cold storage extending over lengthy periods, such as is involved in the exportation of butter to markets in Great Britain

and other countries overseas. In every case the results of the experiments were in confirmation of the results of former experiments which had been carried out from time to time, and go to provide, if such is necessary, additional evidence in support of pasteurisation.

Generally, the quality and appearance of the butters coming forward for market indicate that factories are giving closer attention to what may be described as the details in manufacture than was the case during the war and the years immediately subsequent to it. This may be regarded as a healthy sign and be taken as an indication that manufacturers are alive to the importance of zealously guarding the reputation of dairy produce of Queensland origin and the necessity to avoid any loss of prestige which would assuredly take place if laxity in attention to the methods of manufacture is allowed to creep in.

Market Conditions.

The reversion to open market conditions in Great Britain that occurred during the year brought with it a return to the older and more established order of affairs, under which dairy produce of this State is brought into open competition with that of other countries; but in another respect the position of the market was unique, because of the heavy accumulation of stock of Australian butters which were owned and held in cold storage by the Imperial authorities, and it was found most difficult to dispose of the new season's make of Australian butter in either satisfactory quantities or at remunerative prices. Merchants were afraid to purchase large quantities of butter, bought in a hand-to-mouth way. These conditions prevailed throughout the earlier portion of the season, and eventually the Imperial authorities decided to unload the stocks of stored butter held by them. It is understood that this butter was sold at a figure considerably less than half the amount of the original purchase cost. Immediately those stored butters were made available to consumers at a comparatively low price, the market for freshly-made Australian butters collapsed, and as a result the dairy industry here received a severe shaking.

Manufacturing companies were for some months unable to gauge accurately the true position of the markets, and with nothing more for their guidance beyond the definite knowledge that the value of butter had become depreciated and the condition of the market reduced to a disorganised and chaotic state, exporting companies were placed in a most awkward position, particularly as they had further quantities of butter shipped on consignment, upon which it appeared that they would be faced with heavy reclamations.

It was natural, under the circumstances, that manufacturing companies sought to protect themselves against additional monetary loss by adopting the only means within their power, and that was to materially reduce the rates for cream delivered to them; and in this way the value of cream was reduced to a figure lower than that recorded within the past ten years.

The adjustment made in this manner was efficacious in adding to the security of the position of manufacturing factories, but it did not tend towards the alleviation of the difficulties which producers were experiencing. Excessively low rates for cream brought consternation amongst dairy farmers, who found it impossible to carry on dairying profitably. Luckily, this unsatisfactory condition of affairs was short-lived, as fortunately the market for dairy produce recovered much more rapidly than was generally anticipated, principally on account of the demand for the cold-stored butters being stronger than it was expected would be the case even by those closely connected with the trade. The butters were eagerly sought after by consumers, and the incident indicates that the appetite of the consuming public for butter has not been seriously affected either by the rationing of supplies, as was customary for some years past in Great Britain, or by the enforced use of margarine as a substitute for butter. Evidently there still exists practically an unlimited demand for butter provided the quality is satisfactory and the price within the purchasing power of the people.

The rapid recovery of the market brought considerable relief to producers, and the oversea market has now assumed a much more buoyant tone, and with little or no butter carried over in cold stores a continuance of satisfactory prices may be reasonably expected. Certainly the prospects for the approaching season are encouraging and the outlook is decidedly in the producers' favour.

Cold Storage.

The matter of the inadequacy of cold storage accommodation available for the storage of dairy produce has been referred to in former reports upon the industry, and the importance of ample and efficient cold storage, affecting as it does the

quality of the dairy produce intended for export and the progress of the industry generally, has been specially mentioned.

The complement of dairy produce coming forward during the flush of a normal season has reached a point beyond the capacity of the existing cold stores, and the Government has, in consequence, decided upon the erection of a cold storage premises, which will be situated on a water frontage at Hamilton. It is intended that provision shall be made within the cold storage premises to allow for the cold storage of dairy produce, fruit, eggs, and products of like kind.

The work of construction of the necessary buildings and wharfage accommodation for vessels receiving refrigerated cargo from the stores has been under way for some time past, and the progress made to date gives promise of a section of the premises being completed and available for use for storage purposes early in the new year.

Improved Shipping Service.

Throughout the year a much-improved shipping service than that on offer for seven or eight years past has been enjoyed, and the export section of the industry has benefited accordingly. Ocean liners carrying produce in refrigerated chambers have left our port with greater frequency of late, and, in addition, transit charges have been reduced somewhat.

Revival in Interstate Trade.

There has taken place a revival in the interstate trade in dairy produce, which may be attributed to the abandonment of "winter-pooling" of butter—a practice which owed its origin to the war. The requirements of Southern States in butter fluctuate considerably in agreement with the winter season experienced by them. The indications are that the volume of the "interstate trade" in butter during this winter will exceed 30,000 boxes. The popular taste in Australia is for "fresh" butter which is held in preference to butter which has been subjected to cold storage.

A comparatively small quantity of butter was introduced by merchants into Victoria from New Zealand during the earlier months of the winter, and by far the greater portion of this butter was utilised for the purpose of the trade in tinned butter, and it was ultimately reconsigned by Victorian merchants to the markets in the East. By arranging to carry out the tinning operations in bond, payment of the duty charges imposed upon imported butter was avoided, and it thereby became possible to land New Zealand butter in Victoria, repack the butter into tin containers in bonded store, and later ship it to the East at a cost lower than the then prevailing quotation for Queensland butter. No exception can be taken to the indulgence in a trade of this nature, but the incident is mentioned because it was reported that the reason of the intake of butter from New Zealand was to the quality of Queensland butter being found unsatisfactory for the Melbourne market, but the statement was ill-advised, and quite unwarranted on the grounds alleged.

It was really the matter of difference in the relative cost of purchase between Queensland and New Zealand butters that militated against the exclusive use of Queensland butter for the purpose of meeting the entire shortage of Victorian requirements in butter. In other words, New Zealand was prepared to accept a price for butter which, exclusive of import duty, was somewhat below the figure at which Queensland was prepared to do business at the moment the purchase was effected. Only a limited quantity of butter of New Zealand origin actually passed into consumption in Victoria.

CHEESE.

The production of cheese in this State continues to be carried on upon a fairly extensive scale, and because of the population of Queensland being less than that of either New South Wales or Victoria, which are the other principal centres of cheese production in the Commonwealth, it automatically follows that there is a proportionate curtailment in the aggregate amount of cheese disposed of in the local market here, and that this State has a goodly percentage of the total production of cheese available for exportation every normal season.

Queensland's Foremost Position.

Queensland occupies the foremost position in respect to the quantity of cheese exported each year, and it is not an unusual happening for Queensland to contribute three to four fold the amount of cheese exported each year by the remaining States of Australia.

Within the year something more than 15,000,000 lb. of cheese was produced, the production being approximately 3,500,000 lb. in excess of that for the former twelve months.

This branch of dairying has reached a stage where it is necessary that careful consideration should be given to the matter of deciding the lines upon which the future development of the industry is to be directed.

In the initiatory stages of the manufacture of cheese in this State it frequently happened that a cheese factory was erected in a somewhat isolated centre to serve the needs of the small dairymen in a community who otherwise would have experienced great difficulty in marketing the milk raised on their farms.

Erection and Equipment of Factories.

As is customary in the case of settlers in a new locality, there was a limit to the amount of capital available for expenditure in the erection and equipment of the cheese factory, and although elaborate buildings and plant were not within reach, the factories generally served the purpose intended of them, and laid the foundation of the cheese industry in this State. However, what was tolerably serviceable as factory, plant, and equipment ten or more years ago fails to meet the requirements of to-day, particularly as we have reached a stage where the principal proportion of the total amount of cheese manufactured is marketed in oversea countries, which incidentally means that the quality of the cheese must be of a standard sufficiently high to withstand the stress of the voyage across seas.

Necessity of Pasteurising Equipment for Cheese Factories.

In previous reports the necessity to add pasteurising plants to the equipment of cheese factories has been emphasised, and if manufacturers here desire to retain a footing for their cheese in oversea markets, it is obvious that they must specially cater for the requirements of such markets, and supply a commodity of the standard of quality suited to the popular taste of the consumers. This can be done by arranging for the pasteurisation of the milk under accredited methods prior to manufacture, but before it is practicable the installation of milk-pasteurising plants at many cheese factories is necessary.

It is granted that money is required in order to purchase and equip a factory with a pasteurising plant, but the expenditure involved is warranted, and amongst the principal advantages to be gained by so doing are (*a*) improvement in the standard of quality, (*b*) material increase in the yield of cheese, (*c*) the production of a cheese which will better stand the conditions of transit from factory to cold store and from cold store to oversea markets. The benefits accruing under the heading of either (*a*) or (*b*) are material, and either is individually sufficient to merit the installation of a pasteurising plant forthwith in every cheese factory in receipt of a reasonable quantity of milk.

By no means at our command, other than the general adoption of the principle of pasteurisation of milk for cheese purposes at factories, is it possible to bring about the improvement in the general standard of quality of the cheese output from factories, a matter which is so essential in order to place this particular branch of the dairy industry upon a satisfactory and permanent footing.

One of the principal companies engaged in the manufacture of cheese installed a milk pasteurising plant at the head factory during the year, and the results derived from its use have been sufficiently beneficial to encourage the company to extend the principle of pasteurisation to some of the branch factories in the immediate future.

For some years past the annual reports submitted have been strong in the advocacy of pasteurisation of milk at cheese factories, and as a consequence it is interesting to record that the results accruing from the application of the principle of pasteurisation of milk at a cheese factory in this State stand in substantiation of the claims voiced in favour of the method by this office.

There remains no longer a doubt whether the adoption of efficient pasteurisation of milk will, when applied here, be equally as advantageous as it has proven to be in other countries. Any hesitancy by factories in the installation of milk pasteurisers on that score is no longer warranted, and the experience so far is that, both in respect to theory and practice, the pasteurisation of milk is a sound proposition for cheese factories, and the equipment of the cheese factory is alike imperfect and inadequate unless a replete pasteurising plant is included.

HERD TESTING.

The practice of testing the dairy herds of individual dairy farmers that were submitted simultaneously in any district or locality was continued throughout the year.

The importance and value of herd testing to the industry generally and those engaged in it individually has been frequently emphasised, and the advantages to be gained by the submission of the herds in unrestricted numbers to a butter-fat test has been advocated from practically every quarter competent to advise upon the matter.

Test Results the Best Evidence of Worth.

Babcock test results are the only undeniable form of evidence of the worth of a cow as an agent for the production of butter-fat. To rely solely upon appearance in the selection of a dairy cow, assessing her merits as a producer in accord with the degree to which she appeals to the eye, or even to weigh her milk without also determining the butter-fat content of same, is frequently, if not always, a misleading plan, and in this connection it is significant to relate that no owner of an untested dairy herd has yet been successful in accurately indicating to the herd-testing officer, prior to herd-testing operations, the relative order of merit of the cows in his herd; and, what is even more convincing, in proclaiming herd-testing as the one reliable means whereby the productive capabilities of a dairy cow are to be determined, is the fact that to date no owner of a dairy herd has been successful in his selection of the animal yielding the most butter-fat in his herd immediately prior to the commencement of the testing operations. Consequently, it can be claimed that herd-testing provides the solution of what otherwise would remain a most difficult and intricate problem—that is, the accurate assessment of the relative merits and demerits of the respective cows in the dairy herds as producers of butter-fat.

Without doubt herd-testing should be more fully patronised by dairy farmers, as it really constitutes the keystone of economic dairy farming.

The Difference Between Profitable Work and Drudgery.

Other things being comparable, it follows that dairy farmers utilising dairy cows capable of the production of something less than 120 lb. of butter per annum cannot successfully compete with dairymen elsewhere whose herds yield equivalent to 300 lb. of butter each year. There exists a distinct difference between "drudgery" and profitable dairy farming, and the elimination from the herds of the unprofitable cows, whose presence is to be exposed by the adoption of systematic herd-testing, leads on to the latter goal, along what is the shortest and most certain route.

Particulars of the localities at which testing was carried out and the results of the testing of the dairy herds within the year, as contained in the report of the Herd-testing Officer, are given below.

Report of the Herd-Testing Officer.

During the first month of the year I was engaged in testing dairy herds on the Atherton Tableland, and although the season was not very favourable for big yields, a fair number of dairymen availed themselves of the opportunity, with the result that twenty-seven herds were submitted and 690 cows tested.

On returning to the South, herd-testing was continued in various districts without interruption until the month of May, when, owing to continued dry weather conditions, testing operations slackened off until rain improved conditions slightly, and work was continued throughout the remainder of the year. The centres in which I have operated in the course of the year are as follows:—Atherton (in the North); Greenwood, Bell, Burton, Warra, Texas, Yelarbon, Gibinbell, and Kurrumbul (on the Darling Downs); Rosewood district in the West Moreton; and Boonara Estate, Goomeri, and Mundubbera in the Burnett.

Satisfied Dairymen.

In Greenwood district tests were continued from last year, and when the fourth testing period was completed in November the dairymen interested decided to discontinue the tests for a season or more, expressing entire satisfaction with the scheme, and they intend at a later date to again apply to this Department for the services of a herd-testing officer. In September a series of tests were commenced in the Warra district, also taking in a few herds from Ehlma and Brigalow to the west of Warra. Further tests were subsequently carried out in the months of December, March, and June, a total of fifty-nine herds being submitted and 1,580 cows tested.

Seasonal Set-backs.

From Yelarbon, on the South-western Railway, an application came along in December, and a testing centre was formed there early in January, with the result that the largest number of herds of the season was submitted and 823 cows tested. Great enthusiasm was shown at the time, and it was arranged to have a second test carried out in April; but on arriving there the season had been so dry and severe that practically all the dairymen were reduced to milking once a day, and only two herds were submitted.

In Goomeri district two tests were carried out in November and February, but here again weather conditions interfered with any further tests being taken during the season.

Texas, situated about 30 miles from Inglewood, was visited during December, and 645 cows were submitted to the Babcock test. Unfortunately, when a retest was mentioned later on, no response was received, and therefore no further tests were carried out. In February twenty-three herds were submitted and 505 cows tested in Mundubbera district, but here again weather conditions interfered with further tests.

At the end of February a series of tests were commenced in the Rosewood district, and subsequent tests taken during April and June. The Testing Association there asked to have a test carried out every sixty days, and I certainly think this an improvement on the ninety days period, which has, up to the present, been the custom under the scheme of herd-testing.

Although the number of herds submitted in this district are not large, much good work has already been done, and it is anticipated that, as summer approaches, many more dairymen will join in the movement. The total number of herds submitted during the year was 278, comprising 6,916 cows.

Test Results.

The daily average yield of milk of all animals tested is shown as 17.5 lb., and the average butter-fat per cent. 4.1, while the average yield of commercial butter daily amounts to .84 lb. The highest herd average recorded is 1.30 lb. commercial butter. If we compare a herd with an average production of 1.30 lb. commercial butter with a herd producing the average—viz., .84 lb. commercial butter daily—taking the lactation as 300 days and both herds containing forty cows, the following figures are of interest:—40 cows of the better herd produce 15,600 lb. of butter, while 40 cows of the average produce 10,080 lb., a difference of 5,520 lb. Taking butter at 1s. 6d. per lb., the best herd returns £1,170, against £750 for the poorer herd, a difference of 54 per cent. in favour of the better herd. If it were possible to improve the dairy herds throughout Queensland to that level, it would mean, roughly, £4,000,000 sterling additional to the dairy farmers of Queensland. While this may not be possible for many years to come, it should not be a very difficult task to raise the average production of our dairy herds by 25 per cent. Assuming that there are 400,000 dairy cows in the State, this would mean an approximate gain of £1,900,000.

During the year sixty-eight samples of herd milks have been analysed for solids; also a large number of skim milks have been put through, which in many instances have shown that considerable losses occur during the operation of skimming—in one instance to the extent of 2½ lb. butter per day.

In most cases an improvement is generally made by more speed, higher temperature, or an addition of more dishes in the bowl of the separator.

As in the past, every opportunity has been given to dairy farmers to learn the method of testing milk and cream, and a fair amount of time has been given to this. During the present season I have been so busy that very few inspections of herds have been made, although in many instances I have been asked to go; but on account of so much actual testing it has been impossible.

As will be observed from the summaries attached, many farmers do not continue the testing, which is much to be regretted, as it is impossible to make any estimate of an animal's production unless at least three testings are carried out.

In regard to this I think the Department should try in some way to exact a promise from applicants that they will continue the tests for at least six months. This would also help the Department in arranging the work of testing for the officers engaged in this work.

PARTICULARS OF DISTRICTS WHEREIN TESTING OPERATIONS WERE CARRIED OUT.

District.	Month.	Number of Cows.	Average Daily Yield of Milk.	Average Fat per cent.	Average Daily Yield of Commercial Butter.
			Lb.		Lb.
Atherton	July	690	13·3	4·3	·67
Greenwood	August ..	257	22·1	4·0	1·02
Ditto	November ..	279	20·4	4·0	·94
Goomeri	ditto ..	681	19·0	3·88	·87
Ditto	February ..	489	19·2	4·0	·89
Texas	December ..	645	18·9	3·7	·82
Yelarbon	January ..	823	20·8	3·8	·92
Ditto	April ..	39	..	..	..
Mundubbera	February ..	505	18·5	4·0	·86
Burton	March ..	157	18·8	4·2	·92
Warra	September ..	382	20·8	3·9	·91
Ditto	December ..	507	18·2	3·75	·80
Ditto	March ..	506	18·9	4·0	·88
Ditto	June	185	12·6	4·6	·68
Rosewood	February ..	156	19·5	4·0	·90
Ditto	April ..	298	12·4	4·4	·64
Ditto	June ..	155	12·0	4·1	·57
Koonda-ii	ditto ..	162	11·3	4·8	·64
Total	..	6,916	..	..	..
Mean average	..	..	17·5	4·1	·84

Summary of Herd-Testing Operations.

Number of cows tested	6,916
Average daily yield of milk per cow	17.5 lb.
Average daily yield of commercial butter per cow	.84 lb.
Average fat per cent. of all cows tested	4.1 %
Highest average yield of milk in a herd per diem	28.7 lb.
Lowest average yield of milk in a herd per diem	4 lb.
Highest average yield of commercial butter in a herd per diem	1.30 lb.
Lowest average yield of commercial butter in a herd per diem	.28 lb.
Highest average fat per cent. in milk of a herd	6.1 %
Lowest average fat per cent. in milk of a herd	3.0 %
Highest yield of milk recorded for a cow per diem	45.5 lb.
Highest yield of commercial butter recorded for a cow per diem	2.18 lb.
Highest test recorded	7.9 %
Lowest test recorded	1.2 %

Technical Instruction.

The conveying of instruction to those engaged in the manufacture of dairy produce was continued throughout the year, and an increased number of requests was received for assistance in dealing with what may be regarded as the more intricate or technical phases connected with the manufacture of dairy products. The applications from factories were of particularly frequent occurrence during the warmer months of the summer, which is naturally the period wherein factories experience the most difficulty in the treatment of the milk or cream received from the dairy farms.

At present there are five dairy instructors engaged upon the dairy staff, but owing to the growing demand from factories for their services and the appreciable expansion of the industry which has taken place within recent years, the time is at hand when consideration must be given to the advisability of strengthening the number of dairy instructors somewhat.

Analyses.

A considerable number of samples of dairy produce, also water used for dairy factory purposes and ingredients employed in the manufacture of either butter or cheese, such as salt, rennet, preservative, artificial colouring matter, were submitted during the year to the Agricultural Chemist (Mr. J. C. Brünnich) for analysis, and the Government Bacteriologist (Mr. C. J. Pound) carried out the examination of many specimens of dairy products forwarded for bacteriological purposes by the Dairy Branch.

CONSERVATION OF FODDER.

No distinctive progress was made during the year in the matter of conservation of fodder in any of the accredited forms; consequently, as a result of the somewhat severe winter and with a decrease in the customary amount of the rainfall, coupled with an absence of ample supplies of fodders stored on the dairy farms in readiness to draw upon for the feeding of dairy stock, there occurred a noticeable shrinkage in the quantity of dairy produce raised during the winter period.

Insurance Against Shortage.

Dairy farmers will fail to enjoy the maximum return from their industry until such time as every dairyman conserves on his farm an ample supply of fodder to meet the requirements of his herd during every period of shortage in the supply of field pastures.

The conservation of fodder on an elaborate scale is something that cannot be achieved without the exertion of considerable effort on the part of owners of dairy herds, but there is no denying the advantages that are to be gained by the general adoption of a higher standard of animal husbandry.

The dairy farmer who conserves his fodder scores heavily during periods of dry weather over the man who does not practise the conservation of fodder. The former receives comparatively higher monetary returns from the factory for his produce; he reduces the risk of loss in his stock to a minimum, and immediately the season changes to normal his cows respond with an increased flow of milk, owing principally to the fact that their vigour had not been impaired by the temporary withholding of sufficient nutriment.

It appears that in the aggregate the advantages to be gained by fodder conservation are too great to sacrifice longer, and the way to overcome the difficulty is for every dairy farmer to conserve a supply of fodder on the farm, either in the form of ensilage or as hay in stacks, according to the kind of crop which may grow to best satisfaction in his particular locality.

THE BANANA BEETLE BORER—IV.*

BY JOHN L. FROGGATT, B.Sc., of the State Entomological Staff.

Mr. Froggatt is specially investigating the history and habits of the Banana Beetle Borer, and subjoined is his fourth progress report which has been made available by the Minister for Agriculture and Stock (Hon. W. N. Gillies).

The following report covers the period August to December, 1922, during which the course of this research work was considerably interrupted through several causes. As assistance was not available, some lines of experimentation have not been able to be carried to such lengths as was anticipated. Observations on the habits and life history of the borer have been continued, and some fresh lines of investigation begun.

Those more directly interested in banana-growing are being more generally seized with the seriousness of the position as regards the menace of the banana beetle borer to the industry. During the last six months, further information, obtained on the distribution and depredations of this pest, shows it to be present in several parts previously thought to be clean. In one case reported, the plants were trying to throw bunches, but had only enough strength to partially develop half the first hand, and sometimes a few fingers on the second. The grubs of the beetle borer had completely riddled the butts, and had travelled 2 feet to 3 feet up the stems. Although speaking volumes for the vitality of the banana plant, it shows what havoc the borer will cause if allowed to run wild, and further, what a huge menace to the district such a plantation is.

THE EGG.

With imagos under observation, the rate of oviposition remained low throughout August; early in September, however, it increased most markedly and remained high until the middle of November, when it began to decrease again. From then, to the end of December, it has shown fluctuations, but has been below the average of September-October. The counts of the eggs, month by month, are given in Table A. A considerable increase in the activities of the beetles, in the field, was manifested in the first half of September, as compared with those pertaining in the previous month, thus corroborating laboratory observations.

These data, taken in conjunction with others previously obtained, appear to show that there are two periods in the year during which the activity of the beetles is infinitely greater than at other times—namely, March to the middle of May, and September to the middle of November (both inclusive); their activity appears to be greater in the summer than in the winter months.

Eggs laid in September matured in an average of 15 to 17 days; in October in 9.6 to 10.7 days; in November in 6.4 to 7.7 days; and in December in 6 days. Further details are given in Table B.

About twenty-four hours before the larva is ready to emerge, the jaws appear as two fine brown lines; then the palpi are to be seen, and later, the plates of the head. This gradual development is plainly visible through the egg envelope. When ready to emerge, the larva eats a hole in the covering, and by contracting and expanding the body, gradually draws itself out, at the same time working its way into the plant.

THE LARVA (OR GRUB).

The grubs have been largely bred in thin slices of corm, changed as required, in order that their development might be more closely studied. The rate of mortality amongst those transferred was exceedingly high, but sufficient were bred to enable definite data to be obtained. The larva casts its skin (or "moults") at least twice before reaching maturity; one took place 5 to 7 days, and, another, 20-24 days, after emergence; there are probably one or more moults between those cited.

The period for the larva to reach full developmnt has been found to be from 55 to 60 days (eggs laid 4-12 September, 1922) to 27 to 33 days (eggs laid 3-6 November, 1922). Details of observations are given in Table C.

When the larva has finished feeding, it lies comatose in the end of the larval tunnel, the body becoming flaccid and elongated and the thoracic segments more prominent. This dormant period lasted for 2 to 3 days, when the larval skin was cast, leaving the pupa lying bare.

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* No. 1, "Queensland Agricultural Journal," September, 1921, Vol. XVI., pp. 200-208.
No. 2, "Queensland Agricultural Journal," May, 1922, Vol. XVII., p. 240.
No. 3, "Queensland Agricultural Journal," October, 1922, Vol. XVII., p. 279.

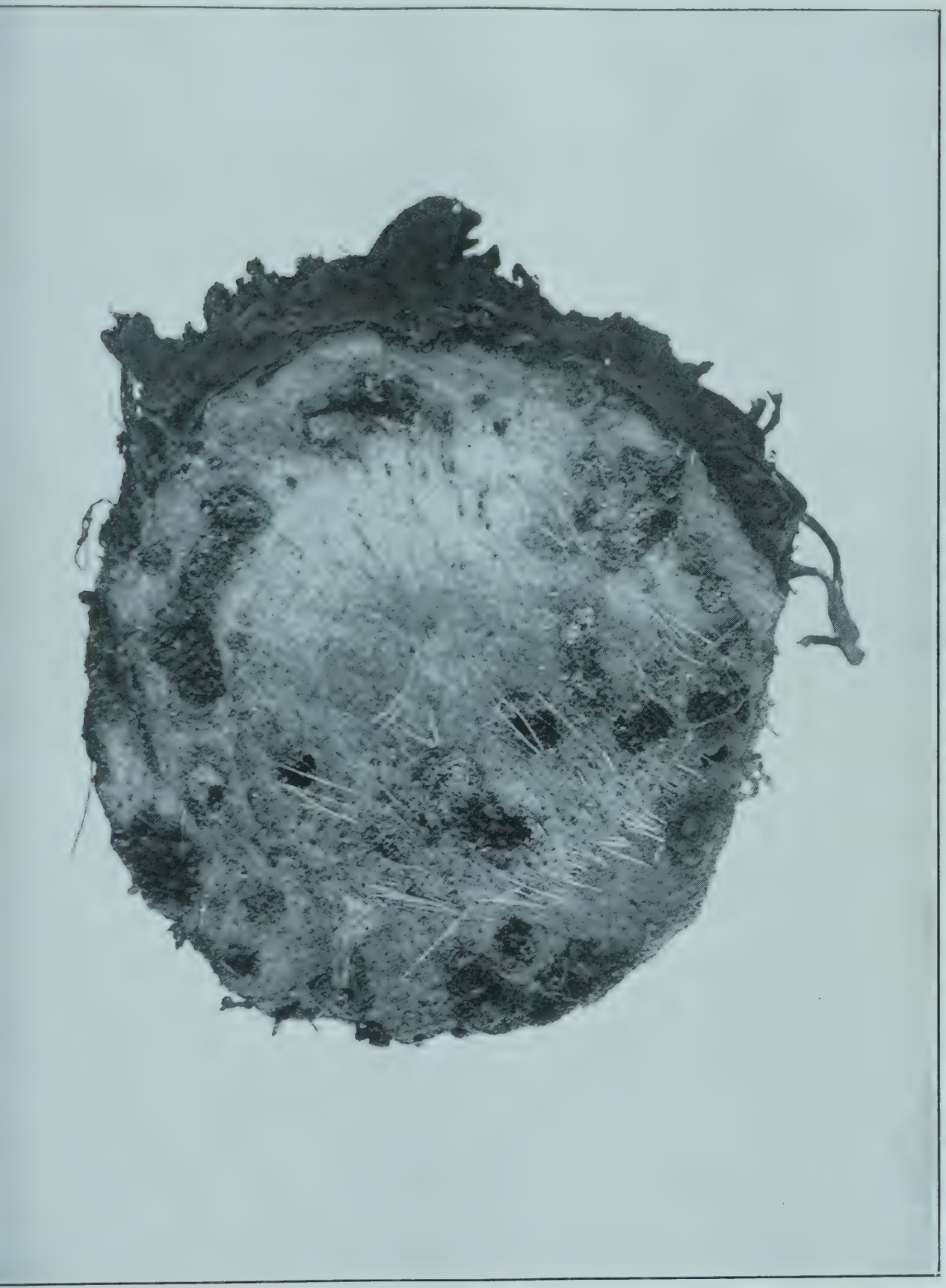


Plate 22.—Infested Banana Corm, showing Grub Tunnels.

THE PUPA (OR CHRYSALIS).

With larvæ pupating in September, the pupal period was 12 to 14 days; early in October it had decreased to 8 to 11 days; and in November-December the average was 6-7 days. Details are given in Table D.

From one to two days before the beetle is ready to emerge, a faint colouring of the joints of the legs is first noticed, and a little later, the plates of the head; this gradually spreads then deepens in tint until the whole body is a lemon, to light reddish-brown, which is the colour of the beetle on leaving the pupa.

In some cases a few fibres are found in the rear end of the pupal chamber; this is more generally found in old corms of a dry nature.

Records on the full life-cycle (from egg to emergence of beetle) gave 78 to 86 days for eggs laid 4-12 September, 1922, the period gradually decreasing to 41 to 44 days for those laid 3-6 November, 1922. Details are given in Table C.

PLATE 23.—BANANA CORM, SHOWING GRUB TUNNELS AND PUPA OF BANANA BETTLE BORER, IN SITU.

THE IMAGO (OR BEETLE).

The beetles lie dormant for 6 to 7 days before showing any marked inclination to move about, by which time they are a very dark reddish-brown in colour. They do **not** become fully coloured for about 14 to 15 days (average) after emergence, and often take longer than this.

The rate of mortality amongst the newly-emerged beetles bred in the laboratory was very high. Field observations, to check this under natural conditions, were not practicable.

Continued observations on the longevity of the imagos have shown that feeding on banana corm they live 474 to 489 days; in this case the beetles were collected in a plantation on 11-18 May, 1921, and died out 4-12 September, 1922. Imagos bred from pupæ, collected in the field and fed on corm, lived for a maximum period of 471 to 488 days. Details of the results of these observations are given in Table E.

Progressive results (in percentages) of the total number of beetles alive in this series are shown in Table F.

In moist or damp soil, the beetles will live without food for some time, but kept under by dry conditions they die rapidly.

Tests on the poisoning of corm baits have been continued, but owing to a continued scarcity in the number of beetles to hand, and numerous interruptions affecting the essential continuity of procedure, this work could not be carried to the degree of finality that was anticipated. A number of tests were made with borax as the active principle. Over long periods of exposure to the treated corm, this chemical was found to be extremely deadly on the beetles, but over shorter periods, such as would normally be the case under field conditions, it was not nearly so effective. No test, so far, has given results comparable with those obtained with either "Paris green" or arsenite of soda, used as dry powders. (*Vide* Banana Beetle Borer III., "Agricultural Journal," October, 1922.)

Experiments have been made in both the laboratory and the field to ascertain the powers of flight, if any, of the imagos. In order to prevent them crawling away, a kerosene tin was cut down and filled with water: the beetles were placed in a tin lid, without corm, on a float, moored in the centre of the tin. These tests were started, both in the morning, and late afternoon, during October, November, and December. In no case did beetles get across the water. Further series of tests, on this function of the adult, will be carried out at a later date.

Where beetles are exposed to heat, in such a way that they are unable to crawl from it, they roll on to their backs, and after waving their legs in the air for a few seconds, die. The heat of the sun on a tin lid is sufficient to give this result. In no case have they been observed to even attempt to expand their wings.

It has been stated that the beetles can be drowned by submergence in water. In order to test this, a given number of beetles were taken in each of five lots, one, acting as a control, with the beetles feeding on corm over damp earth; in the other four, no corm was placed. In No. 1 the earth was damp, in No. 2 it was wet, and in No. 3 it was waterlogged. In No. 4 the beetles were submerged in ordinary tap water. In Nos. 1, 2, and 3, the beetles were buried in the soil. After a period of ninety-six hours' immersion, 90 per cent. were removed alive from these lots and, feeding on corm, were still alive ten days later. It, therefore, does not seem at all likely that it would be practicable either to drown the beetles out of a plantation, or, even kill them by immersing infested suckers in water. It should be stated that the jars, in which the tests were made, were exposed to ordinary room temperature throughout the course of each series.

Preliminary tests have been made with Paradichlorobenzine in order to ascertain its action on the beetle borer when added to the soil.

Laboratory experiments have shown that, when a few grains of the chemical are sprinkled on the bottom of a tin, and covered with 4 inches of soil, beetles, being buried 3 inches below the surface, they appear on top of the soil within two to three hours, whereas, under similar conditions without the chemical, they do not show up within at least eight hours. It thus drives them out from a confined area. The odour was quite noticeable in the soil for more than a fortnight after being treated. In a closed space, its vapours are exceedingly deadly on both the grubs and the beetles. Field tests with this compound have not yet been carried far enough to enable conclusions to be drawn from them.

There is no doubt whatsoever, but that the most important factor in laying out a plantation, in relation to this pest, is to start with clean suckers. There is far too great a spirit of laxity over this matter, although more attention is now being paid to it than heretofore. It is not sufficient to see a plantation looking healthy and in other ways prosperous, to say that it is free from beetle borer. It may be present to a very slight extent, even in only a few stools. A careful examination should be made before taking suckers from any plantation, particular attention being paid to old stems and butts; if the pest is present, the grub tunnels will be found. Even if the plantation appears to be free, make doubly sure of obtaining clean suckers by never allowing the suckers to lie on the ground, overnight, in the plantation; or, in other words, do not dig any more suckers than can be carted away that same day.

As no new advice can be given on remedial measures, it is unnecessary to reiterate what has been published before on it.

Statements have been made that small red ants destroy a considerable number of the grubs of the beetle borer. In order to do this, they must first gain entrance to the tunnels in the corm. During the last twelve months, a careful watch has been kept, in a large number of plantations for any occurrence of ants in banana corms. In old bulbs, where the beetles emerging had left openings onto the surface, ants

have been found nesting, often in considerable numbers, in old disused tunnels. In the new workings, where the grubs were, however, they have never yet been seen. It was not expected that they would be, because the grubs pack up the tunnels so tightly behind them with their sawdust-like excreta, that the ants are unable to reach them.

PLATE 24.—GRUB PUPA, AND ADULT OF BEETLE BORER.
(Natural size.)

Owing to numerous inquiries having been made as to what the beetle is like, &c., it is thought advisable to add a few brief notes on the various stages.

The eggs are small white objects, about one-twelfth of an inch long; they are laid singly in small burrows, lying just under the surface of the plant, at about ground-level.

The grub, on emerging from the egg, begins to tunnel its way into the plant, packing up the space behind with sawdust-like excreta. When fully developed, it comes to rest close to the surface of the bulb and turns into the pupa. When full-grown, it is about half an inch long, the body creamy white with the head reddish-brown. It is in this stage that the borer does the damage to the plants, the grubs devouring an enormous amount of plant material.

The pupa (or chrysalis) is slightly under half an inch in length; it is creamy white and shows the outlines of the beetle. This is a quiescent stage.

The beetle is slightly less than half an inch long and jet black in colour. It has a long, slightly-curved trunk, in front of the head. It is extremely sluggish, and pretends to be dead when disturbed.

In conclusion, the writer wishes to express his indebtedness to Messrs. Brünnich (Chemist's Branch) and Coleman (Pure Seeds Branch) for supplying samples of Paradichlorobenzine for experimental purposes.

SUMMARY OF CONCLUSIONS.

I. Development and deposition of eggs is at its maximum in spring and autumn, decreasing most markedly in summer and winter.

II. The imagos, feeding on corm, have lived for more than seventeen lunar months in captivity.

III. The beetles can survive an immersion in water, at room temperature, of ninety-six hours' duration.

IV. Tests on the powers of flight of the imagos have, so far, given negative results.

V. Para-dichlorobenzine, in laboratory tests, has shown strong toxic properties on the beetles in a confined space.

VI. Care in obtaining suckers free from the pest cannot be too strongly emphasised.

EXPLANATION OF PLATES.

No. 1. Section of Banana Corm, showing Grub Tunnels and Nature of Injury.

No. 2. Pupa of Banana Beetle Borer in situ.

No. 3. Larvae, Pupæ, and Imagos of Banana Beetle Borer.

TABLE A.

Lot. (Refer to Table F).	Eggs Laid to 31st July, 1922.	Eggs Laid for Months of—					Total Eggs Laid to 23rd December, 1922, in the Lots.
		August, 1922.	September, 1922.	October, 1922.	November, 1922.	December to 23rd inst.	
*E	55	0	..	..	..	..	55
F	507	0	..	..	..	..	507
G	2,084	0	0	..	..	..	2,084
H	62	0	..	..	..	..	62
I	1,653	1	0	..	..	..	1,654
J	559	1	7	0	..	..	567
K	697	0	0	0	..	..	697
L	435	0	..	..	..	..	435
T	191	0	25	31	11	0	258
U	16	0	0	..	..	..	16
V	87	4	0	..	..	..	91
*W	3	2	1	3	7	..	16
X	2	6	159	322	151	71	711
Y	..	1	163	412	189	116	881
Z	..	..	30	361	223	85	699
1	..	..	..	147	140	22	309
2	..	..	..	120	120	20	260
3	..	..	..	..	99	111	210
4	..	..	..	..	..	210	210
5	..	..	..	..	..	0	0
Totals ..	6,351	15	385	1,396	940	635	9,722

TABLE B.

Eggs Laid.	Days to Showing of First Sign of Mandibles.	Days Thence to Emergence of First Larva.	Days for Total Emergence.
28/8/22 to 29/9/22	9·5–15·8	2·4	15–17
	(Max. 14–21)	..	(Max. 19–26)
	(Min. 7–11)	..	(Min. 13–14)
29/9/22 to 30/10/22 ..	7–8	1	9·6–10·7
	(Max. 9)	..	(Max. 11–13)
	(Min. 6)	..	(Min. 8–9)
30/10/22 to 27/11/22 ..	5·6	1	6·4–7·7
	(Max. 7)	..	(Max. 7–9)
	(Min. 5)	..	(Min. 6–7)
27/11/22 to 20/12/22 ..	5	1	6
	..	..	(Max. 6–7)
	..	..	(Min. 5–6)

TABLE C.

Eggs Laid.	Egg Period in Days.	Larval Period in Days.	Pupal Period in Days.	Full Life Cycle in Days.
4-12/9/22	18–21	55–60	5 (Min.)	78–86
13-19/9/22	19–20	48–49	7	69–76
18-22/9/22	14–15	55–58		69–73
19-26/9/22	18–20	41–42	6	60–68
22/9/22–12/10/22	11·2–12·8	42·6–47·2	6·6–7·8	59·2–65·4
12-27/10/22	7·5–10	36–39·7	6·5–7·7	52·5–56
27/10/22–3/11/22	5·5–9	33–34·5	5–6	44·5–49
3-6/11/22	6–8	27–33	5–6	41–44

TABLE D.

Larva Dormant.	Larva Pupated.	Pupa Coloured.	Imago Emerged.	Dormant Period in Days.	Days from Colouring to Emergence.	Pupal Period in Days.
..	16-18/9/22	29-30/9/22	30–9/22 to 1/10/22	..	1–2	13–14
18/9/22	23-25/9/22	4-5/10/22	6-7/10/22	5–7	2	12–13
30/9/22	3-4/10/22	..	13-14/10/22	3–4	..	9–11
9/10/22	11-12/10/22	18-19/10/22	20-21/10/22	2–3	2	8–10
16/10/22	16-17/10/22	23/10/22	25/10/22	..	2	8–9
13/11/22	15-16/11/22	20/11/22	22-23/11/22	2–3	2–3	7
10/11/22	11-13/11/22	..	19/11/22	1–3	..	6–8
20/11/22	20-21/11/22	25-27/11/22	27-28/11/22	..	1–2	7
24/11/22	26-27/11/22	30/11/22 to 3/12/22	2-4/12/22	2–3	1–2	5–7 (av.)
29/11/22	30/11/22	4-5/12/22	6-7/12/22	1	2	6–7
1/12/22	3/12/22	8-9/12/22	10-11/12/22	2	1–2	7–8 (av.)
4/12/22	5-11/12/22	10-15/12/22	11-17-12/22	1	2–3	7–8 (av.)
7/12/22	7-11/12/22	13-15/12/22	14-17/12/22	1–2	1–2	6–8 (av.)
8/12/22	9-10/12/22	14/12/22	15-16-12/22	1–2	1–2	6
11/12/22	11-13/12/22	16-17/12/22	17-18/12/22	1	1	5–6
11-14/12/22	14-15/12/22	20/12/22	21-22/12/22	1	1–2	7

TABLE E.

Collected or Bred.	Lot. (See Table F.)	Dates of Collection or Breeding.	Dates of Last Death.	Life in Days.	Life in Terms of Lunar Months, &c.
Bred ..	E	24-27/4/21	1-15/8/22	471–488	16 months 3 weeks and 2 days to 17 months 1 week and 5 days
Collected ..	F	29/4/21 to 5/5/21	25/7/22 to 1/8/22	454–461	15 months 3 weeks and 5 days to 16 months 1 week and 4 days
Collected ..	G	11-18/5/21	4-12/9/22	474–489	16 months 3 weeks and 5 days to 17 months 1 week and 6 days
Collected ..	H	24/5/21	21-28/8/22	454–461	16 months and 6 days to 16 months 1 week and 6 days
Collected ..	I	28/5/21 to 4/6/21	18-22/9/22	478–482	17 months and 2 days to 17 months and 6 days
Collected ..	J	18/7/21	6-10/10/22	445–449	15 months 3 weeks and 4 days to 16 months and 1 day
Collected ..	K	1/8/21	29/9/22 to 3/10/22	424–428	15 months and 4 days to 15 months 1 week and 1 day
Collected ..	L	2-15/9/21	1-15/8/22	320–347	11 months 1 week and 5 days to 12 months 1 week and 4 days
Collected ..	T	21-24/2/22	4-8/12/22	283–290	10 months and 3 days to 10 months 1 week and 3 days
Collected ..	U	14-15/3/22	4-12/9/22	172–181	6 months and 4 days to 6 months 1 week and 4 days
Collected ..	V	10-11/5/22	25-29/9/22	198–203	7 months and 2 days to 7 months and 1 week
Bred ..	W	16-20/4/22	27/11/22 to 1/12/22	221–224	7 months 3 weeks and 4 days to 8 months

TABLE F.

Lot.	*E.	G.	H.	I.	J.	K.	L.	T.	U	V	*W.	X.	Y.	Z.	1	2	3	4	*5
Date Collected or Bred.	24-27/4/21.	11-18/5/21.	24/5/21.	28/5/21 to 4/6/21.	18/7/21.	1/8/21.	2-15/9/21.	21-24/2/22.	14-15/3/22.	10-11/5/22.	16-20/4/22.	20-21/7/22.	1-12/8/22.	1-16/9/22.	13/10/22.	18/10/22.	7-8/11/22.	27-30/11/22.	1-4/12/22.
No. Collected.	16	379	26	324	85	119	72	50	16	190	9	144	90	150	58	50	270	100	7
Alive on—	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
1/8/22 ..	6·8	15·0	3·9	11·1	4·7	·8	1·4	22·0	12·5	89·5	77·8	95·8	..	..	..	..	..	..	..
15/8/22 ..	..	7·1	3·9	8·7	4·7	·8	..	16·0	6·3	87·9	55·6	95·8	100·0	..	..	..	..	..	..
28/8/22 ..	..	3·2	..	5·6	4·7	·8	..	12·0	6·3	78·9	44·4	94·5	98·9	..	..	..	..	..	..
12/9/22 ..	..	..	..	1·2	2·3	·8	..	10·0	..	2·1	44·4	93·8	96·7	..	..	..	..	..	..
22/9/22 ..	..	..	..	..	2·3	·8	..	10·0	..	1·1	44·4	92·4	93·3	100·0	..	..	..	..	..
29/9/22 ..	..	..	..	..	1·1	·8	..	10·0	..	..	33·3	92·4	91·1	100·0	..	..	..	..	..
3/10/22 ..	..	..	..	..	1·1	..	..	10·0	..	..	22·2	91·7	87·7	100·0	..	..	..	..	..
10/10/22	..	..	..	..	..	..	..	10·0	..	..	22·2	90·3	86·7	100·0	..	..	..	..	..
16/10/22	..	..	..	..	..	..	..	6·0	..	..	22·2	90·3	85·6	100·0	100·0	..	..	..	..
23/10/22	..	..	..	..	..	..	..	4·0	..	..	11·1	87·5	83·3	99·3	93·1	100·0	..	..	..
10/11/22	..	..	..	..	..	..	..	1·0	..	..	11·1	77·8	76·7	96·0	87·8	98·0	100·0	..	..
1/12/22 ..	..	..	..	..	..	..	..	1·0	..	..	..	65·2	68·9	90·7	81·0	92·0	95·2	..	..
8/12/22 ..	..	..	..	..	..	..	..	..	..	..	..	64·6	66·7	89·3	81·0	86·0	94·1	99·0	100·0
15/12/22	..	..	..	..	..	..	..	..	..	..	..	60·4	60·0	86·0	75·8	80·0	92·9	99·0	100·0
30/12/22	..	..	..	..	..	..	..	..	..	..	..	52·8	53·3	83·3	70·6	74·0	89·6	96·0	100·0

A SUMMARY OF SOME EXPERIMENTS CARRIED OUT BY THE BUREAU OF SUGAR EXPERIMENT STATIONS—VI.

BY H. T. EASTERBY, Director.

The first article of this series, in the course of which Mr. Easterby discussed deep cultivation experiments and tabulated comparative crop results from subsoiled and non-subsoiled fields, was published in the May (1922) *Journal. The second instalment, an account of the results of irrigation experiments and the action of irrigation and manures upon the density and purity of sugar juices, appeared in the June* (1922) *issue. The third instalment, treating of experiments in fertilisation, was published in the August number. The September issue contained an account of distance experiments and resultant crops. In the October Journal, Mr. Easterby continued his summary with notes on the introduction and testing of cane varieties and the testing of certain varieties of cane at Mackay.*—Ed.

Experiments to Determine if Cane Sets Cut from Arrowed Canes have a Prejudicial Effect on the Germination and Subsequent Yield.

It has been frequently stated that cane planted from arrowed sets resulted in a poorer strike and a lower tonnage of cane per acre. No definite information upon this point exists in Queensland, and it is usual to advise the planting of non-arrowed sets where possible. In order that reliable data upon the question might be secured, an experiment was laid down at the Mackay station in a most careful and accurate manner. An absolutely uniform piece of land was chosen and carefully prepared.

The plants were selected from a field of cane of the variety known as Q. 116. This was all of the same age, but some had arrowed while other portions had not. Care was taken to choose canes for plants under both these conditions that were as like each other as possible in all details except arrowing. The same number of three-eye plants were placed in every drill.

Great care was taken in the planting, each one being carefully inspected before placing in the drill, so that every precaution might be taken that none of the eyes were in any way damaged. The germination was most carefully noted every week during the early period of growth, every shoot showing in both plots being counted.

Early in December, whilst the process of stooling out was in progress, a further count of every shoot above ground was made.

The cane in both plots grew exceedingly well and made a fine stand. From the counts at the times abovementioned, the following table has been compiled:—

DETAILS OF GERMINATION IN THE ARROWED AND NON-ARROWED PLANT EXPERIMENT.—PLANT CROP 1914.

Number of Plot.	Variety of Cane.	Date of Planting.	Total Number of Eyes Planted.	Plants Cut from—	Date of First Germination.	Shoots Showing on 4th Sept.	Shoots Showing on 11th Sept.	Shoots Showing on 18th Sept.	Shoots Showing on 25th Sept.	Shoots Showing on 2nd Oct.
1	Queensland 116	1913. 5 Aug.	528	Arrowed Cane	1913. 28 Aug.	87	148	190	214	232
2	Queensland 116	5 Aug.	528	Non-arrowed Cane	25 Aug.	122	178	238	287	306

Plate 25.—Sugar Experiment Station, Gordonvale, N.Q.

DETAILS OF GROWTH IN THE ARROWED AND NON-ARROWED PLANT EXPERIMENT—PLANT CROP, 1914.

No. of Plot.	Variety of Cane.	Date of Planting.	Total No. of Eyes Planted.	Plants Cut from—	No. of Shoots Showing on 9th October, 1913.	No. of Shoots Showing on 1st December, 1913.	Actual Count of Canes on 1st August, 1914.
1	Queensland 116	5 Aug., 1913	528	Arrowed cane	260	748	770
2	Queensland 116	5 Aug., 1913	528	Non-arrowed cane	335	888	777

From the above tables it will be seen that the non-arrowed cane sets assumed the lead, which was maintained right up to August, 1914, but it is noteworthy that the big lead in the beginning was reduced to almost equal numbers by that date, and the arrowed cane finally produced almost as many sticks as that planted from non-arrowed cane.

Summary of Crop Results.

TOTAL CROP RESULTS TO DATE OF CANE IN THE ARROWED AND NON-ARROWED PLANT EXPERIMENT—PLANT AND FIRST RATOON CROPS, 1914-1915.

Number of Plot.	Variety of Cane.	Plants Cut from—	PLANT CROP, 1914.		FIRST RATOON CROP.		TOTAL YIELD—TWO CROPS.	
			Yield of Cane per Acre in English Tons.	Yield of Sugar per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of Sugar per Acre in English Tons.	Yield of Cane per Acre in English Tons.	Yield of Sugar per Acre in English Tons.
1	Queensland Seedling 116	Arrowed Cane ..	55·5	8·2	29·7	4·9	85·2	13·1
2	Queensland Seedling 116	Non-arrowed Cane	51·9	8·0	27·3	4.5	79·2	12·5

The above table shows that the yield from the cane where arrowed cane was used for planting gave a higher yield in the case where the plants were cut from non-arrowed cane.

QUEENSLAND TREES.

BY C. T. WHITE, F.L.S., Government Botanist, and W. D. FRANCIS, Assistant Botanist.

No. 17.

THE BLACK APPLE OR BLACK PLUM (*Sideroxylon australis*).

Its large bluish-black fruit has made this species fairly well known, especially in the temperate coastal parts of New South Wales, such as Illawarra. There is a purplish-black dye in the "skin" of the fruit, and the large, very hard, glossy seeds when pierced at the ends are sometimes made into necklaces or other ornaments by children. The trees attain a height of 100 feet and a barrel diameter of 2 feet. The large tree shown in the picture illustrates the typical form of the species. The channels or grooves in the barrel are very often seen in the trees. In common with other species of Sideroxylon, the bark and green parts of the Black Apple when cut or bruised exude a milky juice, but in some cases we have noticed that the exudation of the latex from the green parts is scanty. The tree is found in the rain forests of Eastern Australia, from Illawarra, New South Wales, to Rockingham Bay, North Queensland.

Photo. by W. D. Francis.]

Plate 26.—The Black Apple or Black Plum (*Sideroxylon australis*).
A tree on Tambourine Mountain.

Photo by Dept. Agriculture and Stock.]

PLATE 27.—BLACK APPLE OR BLACK PLUM.

A.—Diagram of fruit, slightly reduced. B.—A seed.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS FOR DECEMBER, 1922.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			lb.	%	lb.	
Pretty Maid of Harelmar	Ayrshire ...	11 Sept., 1922	960	3·7	41·40	
Bellona	,, ...	30 Aug., ,,	900	3·8	39·90	
College Meadow Sweet	Friesian ...	18 Sept., ,,	930	3·6	39·00	
Thyra of Myrtleview	Ayrshire ...	22 Aug., ,,	810	4·0	37·80	
College Mignon ...	Jersey ..	22 Nov., ,,	660	4·8	37·20	
Confidence... ...	Ayrshire ...	13 Aug., ,,	750	3·8	33·30	
Hedges Nattie ...	Friesian ...	20 May, ,,	660	4·2	32·40	
Yarraview Snowdrop	Guernsey ...	1 Sept., ,,	540	4 9	31·20	
College La Cigale	Jersey ...	10 July, ,,	420	5 9	29·10	
Songstress ...	Ayrshire ...	4 July, ,,	630	3·9	28·80	
Miss Fearless ...	,, ...	30 May, ,,	630	3·9	28·80	
Dawn of Warragaburra	Jersey ...	17 May, ,,	540	4·5	28·50	
Wattle Blossom ...	Guernsey ...	8 Sept., ,,	540	4·2	26·70	
La Hurette Hope	Jersey ...	30 June, ,,	420	4·9	24·30	
Dear Lassie ...	Ayrshire ...	19 June, ,,	540	3·8	24·00	
Netherton Belle ...	,, ...	19 July, ,,	450	4·3	22·50	
Miss Betty ...	Jersey ...	15 May, ,,	360	5·1	21·60	
College St. Margaret	,, ...	16 June, ,,	330	5·5	21·30	
College Bluebell ...	,, ...	22 Oct., ,,	390	4·7	21·30	
Hedges Dutchmaid	Friesian ...	23 Sept., ,,	540	3·3	20·70	

Rainfall for the Month, 313 points.

WEEDS OF QUEENSLAND.

BY C. T. WHITE, Government Botanist.

No. 29.

THE PEACH LEAF POISON BUSH OR WILD PEACH (*Trema aspera*).

Description.—A shrub or small tree, branchlets clothed with rather soft hairs. Leaves usually 2-3 inches long and about ¾-1 inch broad, borne on stalks of 3-4 lines, the base more or less rounded, the apex tapering into a rather slender point. Upper surface rough, with short rigid hairs, under surface velvet-hairy, edges serrate. Flowers small, borne in short bunches (cymes) in the axils of the leaves. Fruit black, ovoid or globose, 1-2 lines in diameter.

Distribution.—A very common plant of Northern and Eastern Australia, often comes up very thickly as secondary growth on "scrub" farms.

Botanical Name.—Trema from the Greek *trema*, a hole (the hard bony covering (endocarp) of the seed is rough and pitted with holes); *aspera*, Latin, meaning rough, referring to the roughness of the upper surface of the leaf.

Poisonous Properties.—Trema aspera—variously known as Wild Peach, Poison Peach, or Peach Leaf Poison Bush—is commonly regarded as one of our worst poisonous plants, and there are numerous references to it as a plant reputed poisonous to stock in the writings of Australian botanists. It has been held by some that the harmful effects attributed to the plant were due to its tough and indigestible nature, when ingested by stock in the absence of softer and more palatable feed, as the plant belonged to a family of plants, the Ulmaceæ, the members of which as a general rule are quite wholesome.

In the proceedings of the Royal Society of Queensland (vol. 32, No. 11) Mr. F. Smith, B.Sc., and the writer, published a paper showing that at times the plant produced a prussic-acid-yielding glucoside, and at such times, if eaten in quantity, especially by hungry stock, might cause death. The presence of this glucoside in quantity would, on the whole, fortunately, appear to be rare, and what controls its formation is impossible on our present knowledge to say.

I have often noticed Wild Peach to be eaten freely by stock without ill effects following, and W. D. Francis, writing in this Journal (vol. XII., n.s., p. 30), stated that the weed was extensively eaten by cattle in the Kin Kin district during drought periods, but that it was the cause of very few if any losses in the district. My personal opinion is that Wild Peach, though at times definitely poisonous, has on the whole been very much overrated as a stock poison.

PLATE 28.—TREMA ASPERA
(Wild Peach or Peach-leaf Poison Bush).
(About natural size.)

STOMACH WORMS *(STRONGYLUS CONTORTUS)* IN SHEEP.

By W. G. BROWN, Sheep and Wool Expert.

This is a pest which yearly is increasing in virulence in districts where it has been long established, and what is most serious is invading districts hitherto free from its ravages.

Like the prickly-pear, its approaches are slow, and almost unnoticed, but when fully entrenched, it will take years to eradicate, and in the meantime do enormous damage to the flocks.

For many years it was believed that the warm and normally dry areas of Western Queensland would always be exempt because of the heat and dryness, but time has shown that these places in the West are as badly infested as any district in Queensland.

Direct losses amongst the young stock must be very great, and the damage does not cease there, for those which survive are stunted and debilitated. Thus they become an easy prey to starvation, blowflies, &c.

The object of this article is to show that the pest can be dealt with and, in time, eradicated. This opinion is founded on knowledge of the life history of the worm, experiences of other parts of the world, and personal experience in Australia.

SCOPE OF ARTICLE.

1st. The life history of the parasite.

2nd. Theories in regard to infestation of country.

3rd. The various measures taken to combat the pest.

4th. Summary and recommendation.

The Life History of the Stomach Worm.

If the life history of a parasite be fully known, it is certain that soon or late it can at least be controlled. The history of this particular pest is very well known. It has been investigated by many well-known helminthologists, and all are agreed. Given shortly, it is this:—

The female worms lay their eggs in the stomach of the animal. These eggs pass out of the body in the excreta. They contain living embryos, which, when suitable conditions of warmth and moisture arise, undergo further development. They hatch out in periods, varying according to temperature, high or low, from two hours to three or four weeks. If the temperature be below 40 degrees Fahrenheit the eggs remain dormant, and can remain in that condition for two or three months, and afterwards hatch out when the weather becomes warmer. The young worm feeds on the organic matter contained in the droppings, and grows until it is one-thirtieth of an inch in length. No further growth takes place until a suitable host has swallowed it, and, as it climbs to the top of the grass blades this is very probable. After being swallowed it matures in the fourth stomach of ruminants (cattle, sheep, or goats) in from two to three weeks.

Before the worm has reached the final stage it does not easily withstand the influence of cold or dryness, but when the so-called ensheathed form is reached, it is endowed with longevity, and grows into the adult stage in the stomach when taken up by a sheep. Such ensheathed larvæ have been found alive six months and longer (Dr. Arnold Theiler, C.M.G., Director of Veterinary Research, S. Africa).

INFESTATION OF ANIMALS.

One thing appears to be quite certain—there is no such thing as "wormy" country. Worms do not appear spontaneously anywhere, and they are not a special creation. They must be carried and deposited by a ruminant. If wheat be sown, wheat will grow. If worms be sown, worms will be produced.

There are only two ways by which infestation of animals and land can be caused—

(*a*) By introducing infected stock on clean land.

(*b*) By placing clean stock on infected land.

Thus the question of control and eradication resolves itself into two methods, which are not impracticable in our case—

(*a*) Cleaning infected land before allowing ruminants to graze on it; and

(*b*) Cleaning infected sheep before allowing them to graze on clean land.

CLEANING INFECTED LAND.

Quoting Dr. Theiler again, he says—

"The facts which come out of the foregoing notes indicate that as long as sheep graze over pastures which are infected with wire-worms, so long will they be reinfected, particularly when the climatic conditions—warmth and moisture—are favourable for the exit of the worm from the eggs, and for development to the ensheathed stage. Accordingly it must be our endeavour to free a pasture from infection. This can only be done by starving the young worms out, which, as has been shown, will occur within a year, when no proper hosts (*i.e.*, all ruminants) are grazing over the same veld. A farmer must, in the first place, make arrangements that he always has some pasture at his disposal over which no ruminants have been grazing for nine months to one year, so that he can turn his sheep on to such veld as soon as they show worm infection. Before doing so, however, he must take the second important step—viz., to clean his sheep from worms by collecting his sheep into a kraal to dose them. . . . .

"It must be stated here that even the best medicine does not kill all the worms in all sheep, there are always some parasites which escape. Accordingly, a clean pasture will in time become reinfected, particularly in a warm and moist season. It is here that a sheep farmer will be able to show his skill in handling his flock, so that during these periods they never remain on the same pasture, but are changed systematically on to the same veld. When infection becomes too strong again, a new dosing and another change on to clean veld is necessary, the infected land to be kept free from ruminants. In adopting this system of dosing and moving on to clean ground, it will be possible after the lapse of a certain time to free, comparatively speaking, both the pasture and sheep from worms, or at least to so reduce them in number that the worms can easily be kept in check.

"There are additional measures which help to reduce the infection. They can be applied as such, or better in conjunction with above.

"One of them is the burning of the grass. It is known that the young worms crawl up to the top of the grasses from where they reach the stomach of the host. The grass burning should be done in rotation—viz., not the whole farm at a time, but in patches at different times of the year."

Thus Dr. Theiler; and the advice is full of instruction for us. In regard to the burning off of grass, a very common opinion of Queensland sheep farmers is, that on worm-infected country, the grass which grows after the burn cleans the worms out of the animal. This is a dangerous fallacy. It is true that wormy sheep do improve on grass grown on burnt country, but the explanation is this: The grass which comes after a burn is generally soft and nutritious. Worms are blood-sucking animals, and ruminants grazing thereon, make enough blood to satisfy the worms and leave enough for the sheep to improve in health and condition. The worms always get the first share of the blood. In the meantime, eggs of the worms, which have not been cleared out be it noted, are reinfecting the burnt lands. How quickly the land can be reinfected may be understood when it is known that one female stomach worm lays from 1,000 to 1,500 eggs, and there are thousands of female worms in the stomach of a badly infected sheep.

From the foregoing it is to be seen that, after a burn, or in the case of country free from worms, sheep should be dozed at least three times before being turned on to the land, especially if they are known to come off wormy country. Worms are to be found in sheep in the fourth stomach or abomasum.

Sheep have four stomachs,—First, the "paunch" or rumen. This is the reservoir. The animal gobbles the grass or feed and when satisfied lies in the shade and bringing up the balls of the food from the rumen chews it thoroughly. The chewed food passes into the second stomach or reticulum, otherwise known as tripe in cattle; from there it passes to the third stomach, the omasum or "bible," and then it is passed on to the abomasum or true stomach. It is here that true digestion takes place, and it is here that the thousands of worms are found in a badly infected sheep.

Two instances of several cases I know of, will illustrate the value of Dr. Theiler's arguments when properly applied.

In the first case a man kept one hundred and forty sheep on 14 acres of paspalum. These sheep were Romney Marsh, and had been on the holding for nine years, without trouble or loss of any kind. When I first inspected the sheep they were "mud fat," to use a sheep man's expression, and the youngsters particularly healthy. I warned the owner that on no account should be put strange sheep on his heavily-stocked paddock without thoroughly drenching them twice at least. Twelve months later I called at his place, and found that he had bought sixty "cheap" sheep from a holding notoriously worm-infested, shortly after my first visit. I learned that a few months after his purchase, all the strange sheep had died, all his own weaners, and the remainder of his one time beautiful flock, unthrifty

and full of worms. His land was hopelessly infected, and he had to give up sheep. *Note.*—He had not drenched the strange sheep. *He had put infected sheep on clean land.*

In the second case. About three years ago a telegram came to the office: "3,600 mixed weaners plenty water, grass, 600 dead, rest dying. This from a well-known holding in the Central West."

I thought "worms," and took up enough arsenic and Epsom salts to drench 3,000 sheep twice. One look at the flock showed heavy infection of stomach worms; worms had never been seen in the district before. The sheep were miserably poor and whitefaced, sluggish, and many of them badly "bottled." They were drenched twice and there were few more losses. I advised the owner to put them on to a clean paddock after the second drench, and he did so.

The history of the case shows "infected stock put on clean country," and shows that by following the advice of Dr. Theiler the paddock was cleaned, for the owner kept all stock out of the paddock for twelve months. He assured me eighteen months later that no more worms were found in sheep running there. This paddock was stocked with worms by a mob of worm-infested ewes from wormy country. Here was distinctly a case of clean country infected by wormy sheep, and country made clean by keeping ruminants off for twelve months.

DRENCHING, HOW AND WHAT TO USE.

Drenching is a cheap and simple operation. There are many different drenches on the market, but I have found arsenic and Epsom salts the best and cheapest of all. One of the best authorities in America, Mr. I. F. Craig, M.A., M.R.C.V.S., says in the "Veterinary Review," February, 1915, page 499, after reviewing the action of many worm drenches: "Arsenic, in my hands, has given better results than other drugs."

The arsenical drench I have found very useful is 2 oz. white arsenic (not less than 90 per cent. ars. acid), 6 lb. of Epsom salts, 5 gallons water.

Take an ordinary five-gallon drum, put about 3 gallons water in, and boil the water. Then add the arsenic and Epsom salts. Boil for forty-five minutes, stirring occasionally; add cold water to make 5 gallons.

Dozes.—2 oz. for adult sheep.

1½ oz. for sheep from 9 months to 18 months old.

1 oz. for lambs from 4 months to 9 months.

Fast the sheep for at least fifteen hours before drenching. Drench on four legs, keeping the head slightly above the level. The proper instrument for drenching is a conical-shaped measure, which is adjusted so that more than the proper dose cannot be given. They are to be obtained at any of the agents or retailers dealing in instruments for use with sheep.

Arsenic is a tonic, and dissolved with Epsom salts may be given every seventh day for about a month without danger.

SUMMARY.

Do not put clean sheep on infected country.

Do not put infected sheep on clean country.

If practicable, keep animals which chew the cud off an infected paddock for twelve months.

If practicable, burn off the grass on infected country and only allow clean sheep on the burnt country.

Weaners, or sheep from 3 to 9 months' old, are in danger of their lives if not drenched regularly on infected land.

Keep salt up to the sheep. It is hopeless to expect salt or any other lick to abolish worms, yet it acts in a certain measure against worms.

Overstocking will help to infect country in one-third of the time that reasonable stocking will.

Any country can be freed of worms in time.

Symptoms of worms are—pale faces, pale skin, pale eyes, tongues, and lips, and aften a swelling under the jaw. This means anaemia. The most constant symptoms are scouring, eating of sand and earth, and unusual thirst.

A wormy sheep is one of the first attacked by blowflies.

Do not wait until the animal is dying before treating it, for often the symptoms are too advanced for the sheep to recover, even though the worms be removed.

RECOMMENDATIONS.

Do not introduce wormy sheep on clean country.

Do not introduce clean sheep on infected country.

CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report under date 11th January, 1923, from the Entomologist at Meringa, near Cairns (Mr. Edmund Jarvis).

Moth-Borers of Sugar Cane.

Whilst searching for hymenopterous parasites of our large moth-borer (*Phragmatiphila truncata*, Walk.) numbers of young ratoons with dead hearts were collected at Riverstone, near Gordonvale, which, when subsequently examined, were found to harbour larvæ and pupæ of the smaller Pyralid moth-borer (*Polyocha* sp.).

This insect, although a minor pest of cane, must be considered as being responsible at times for injuries of a rather serious nature, extending in all probability over a considerable area, but, fortunately, so far as observed, affecting only a small percentage of the crop.

On the 18th November, 1920, the writer collected from within an area of one square chain no less than forty-four dead hearts from ratoons eighteen inches high in a canefield at Pyramid, which, when examined, yielded thirty-three larvæ of *Polyocha* sp. In the present instance, however, about 8 per cent. of the shoots collected contained examples of this borer, and fully 8 per cent. of these were parasitised by a braconid wasp-parasite, *Tineid Moth-borer.*

Many of the dead hearts in ratoons got at Riverstone were caused by a little borer, smaller than a clothes-moth (9 m.m. wing expanse), of a dark slaty-grey colour. This pest proved very abundant at Pyramid in 1919, where it was observed infesting third ratoons. Out of seventy-five shoots examined by the writer at that time—about 10 per cent. of those destroyed on a space of about 100 square feet—no less than fifty-five were killed by this moth-borer, and twenty of these contained living specimens of the larvæ.

A full description, together with illustrations of the life-cycle stages of this new cane-borer, was published last year (1921) in Bulletin No. 11 of this Office. Strangely enough, although occurring commonly in several localities around Cairns, this insect was not included in any of our large collections of Australian *Lepidoptera*.

The severest infestations apparently occur among third ratoons, many of which spring from buds situated above ground level, the trouble being less noticeable in the case of first ratoons that arise mostly from buried eyes; while shoots from plant-cane originating well under the soil are rarely attacked.

Notes on Para-dichlorobenzene.

Since reporting on this subject last month, advice has come to hand that the United Kingdom can supply us with a crude form of commercial *P. dichlorobenzene* at £5 per cwt. This is a substantial reduction on the German quotation of £6 per 100 lb., but we are glad to be able to announce that, according to latest advice, the British Drug Houses, upon making further inquiries, find there is a more crude form of this compound which can be supplied at £4 per cwt.

This will bring the cost down to about £2 per acre for a treatment of one drachm injections placed 12 inches apart.

Up to the present we have experimented only with the refined brand of *P. dichlorobenzene*, marketed under the name of "Globol," so that the effect on cane-grubs of crude forms of this compound has yet to be determined. I am of opinion, however, that we shall find these cheaper brands efficient soil fumigants.

Results of Field Test.—On 2nd November a field experiment was started at Meringa in which forty-eight stools of young plant cane (D. 1135) were treated with ¼ to ½ oz. injections, placed along one side of a row, and from 4 to 6 inches from the stools. The adjoining rows of cane on each side of the treated row formed controls.

All injections were 6 inches deep, some being placed immediately opposite the stools and others diagonally in intermediate positions.

When examined six weeks later (14th December) both treated and check stools had made equal growth, while results obtained were as follows:—

> Injections of ¼ oz. placed diagonally and 4 inches from centre line of stools, and injections of ½ oz. situated 6 inches from stools, but opposite same, had no injurious effect on the cane.

Injections of ¼ and ½ oz. placed 4 inches from, and opposite stools, caused some of the outer leaves to wither and curl. The odour of the fumigant had penetrated about 10 inches on all sides of injections, and although the ¼ oz. doses had entirely evaporated, the soil was still charged with the smell of *P. dichlorobenzene*. In another experiment, injections of ½ oz. placed 7 inches below the surface were found to have completely evaporated after fifty-one days, the rainfall during this period being only 91 points.

Emergence of Cane-Beetles.

The long continued dry spell of over three months' duration, terminated, happily, on the 21st instant, when 87 points were registered at our laboratory, followed next day by 46 points of rain.

Temperatures during the forty-eight hours immediately preceding these thunder showers had been very high, the maximum shade heat on the 19th instant being 170° F., and on the 20th 100.5° F.

Cane-beetles appeared close to the Station on the 22nd instant on feeding trees of *Eucalyptus tessalaris* (Moreton Bay Ash), but were not to be found in any numbers until four days later, when they were noticed on *Ficus pilosa* and *nesophila* as usual. Up to the present, however, the emergence has not been heavy at Meringa this season, owing, doubtless, to the recent drought conditions. Specimens collected on the 22nd were observed to be much rubbed, owing probably to repeated attempts to dig their way to the surface before the ground had become softened by rain. More rain (23 points) fell on the 27th instant, so that moist conditions favourable to further emergences have been maintained.

Lepidiota frenchi appeared very freely on the 23rd instant, being the year of its greatest emergence. Grubs of this species pupate at a greater depth than those of the grey-back, so are less likely to be affected by climatic influences.

Lepidiota rothei Blackb. and *Dasygnathus australia-dejeani* Macl. are in evidence as usual.

Species of the class *Insecta* appear to have suffered as a whole from the long spell of dry weather, insects of all orders being very scarce at present.

Office Collection of Insects.

In 1914, when first taking up a study of the cane-grub problem, the writer considered it advisable to form a collection of insects, comprising the following classes:—

(1) Insects devouring the roots of cane.
(2) Insects attacking the stalk and leaves internally.
(3) Insects injuring stalk and leaves externally.
(4) Insects closely related to our more destructive cane pests.
(5) Useful insects, parasitic and predaceous.
(6) Insects incidentally associated with sugar-cane.

During the past eight years a reference collection of this kind has been gradually acquired, but owing to our work in this connection having been of a spasmodic nature, the number of species collected has naturally been small, amounting in all to only 3,796 specimens.

Of these, about 380 species are beetles, of which, 101 species are closely related to our root-eating *scarabœidæ*.

Parasitic insects of the order *Hymenoptera* number about 123 species; while dipterous insects include 74, of which 21 are *Tabanidæ*, (March Flies) and 28 species *Asilidæ* or Robber Flies, the larvæ of the latter insects being predaceous on grubs of our cane-beetles.

Experiments with Aromas for Attracting Cane-Beetles.

This interesting form of control is at present being investigated, and results, so far, have been decidedly encouraging. On the 29th of this month, for instance, it was proved beyond doubt that *Lepidiota frenchi* can be attracted artificially by means of aromas distilled from the bark and foliage of certain of its favourite food-plants.

It remains to be seen by future experimentation which of these odours will prove to be the most attractive. We may, I think, consider this discovery a decided step forward in the right direction, since there is every probability that our grey-back beetle, as I have long believed, will be found to respond positively to odours of a similar nature.

Details of work in this connection will be given in next month's report.

PLATE III.—PREDACEOUS ENEMIES OF CANE GRUBS.

Fig. 1. *Promachus doddi* Bezzi, female. Natural size.

Fig. 2. Egg-mass of same, taken from leaf of sugar-cane. Natural size.

Fig. 2a. Same, enlarged.

Fig. 2b. Separate egg of same, more enlarged, showing segmented larva doubled up inside.

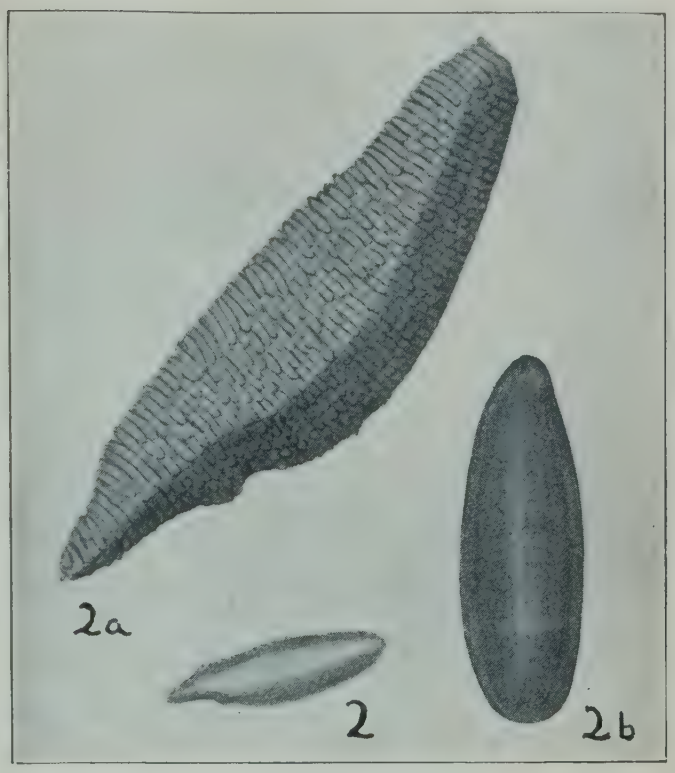
Fig. 3. Grub paralysed by newly hatched Asilid maggot, attached to skin on thorax.

Fig. 4. Maggot; full-grown.

Fig. 5. Asilid pupa.

Fig. 6. Larva of *Agrypnus mastersi* Pascoe.

Fig. 7. The parent beetle, a skip-jack.



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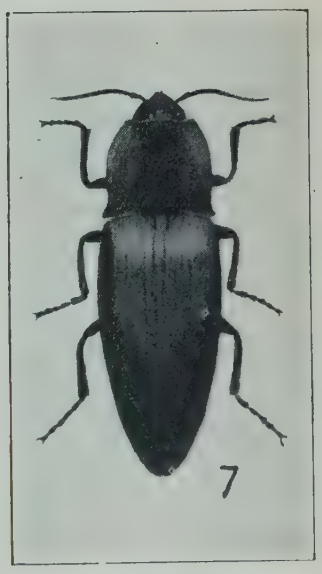


Del. E. Jarvis.

PLATE IV.—STAGES IN THE LIFE HISTORY OF CAMPSOMERIS RADULA FABR.

Fig. 1. Adult female. Natural size.

Fig. 2. Adult male. Natural size.

Fig. 2a. Vertex, showing the three characteristic yellow spots. × 5.

Fig. 2b. Labrum, plain, which is characteristic of this species. × 5.

Fig. 2c. Pygidium, with characteristic yellow on proximal portion. × 7.

Fig. 3. Paralysed grub, showing characteristic position of the wasp egg. Natural size.

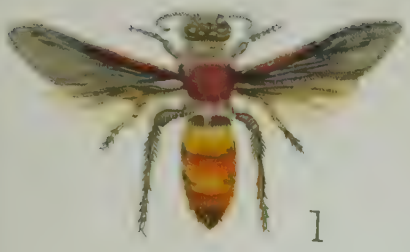
Fig. 4. The egg, two views. Magnified.

Fig. 5. A male larva feeding; age seven days. Natural size.

Fig. 6. A female larva, ten days old, still feeding. Natural size.

Fig. 7. The cocoon of the wasp, in cell. Natural size.

Fig. 8. The pupa of same, in cocoon. × 2.



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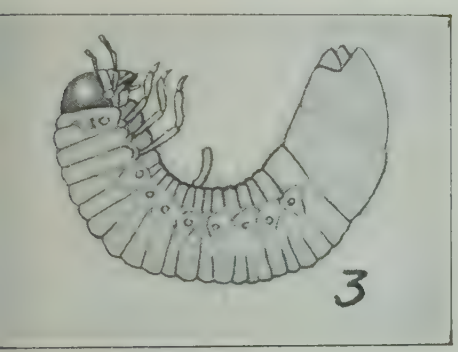

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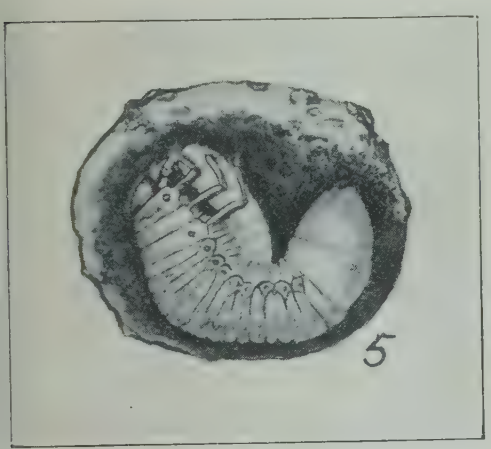

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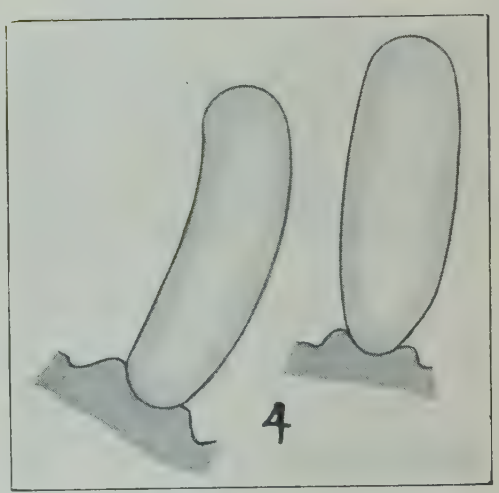

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PLATE V.—COMMON SCOLIIDS OF THE CAIRNS DISTRICT.

Fig. 1. *Campsomeris tasmaniensis* Sauss., female, the usual marking. Natural size.

Fig. 2. Male of same. Natural size.

Fig. 2a. Showing the two characteristic small yellow spots. × 5.

Fig. 2b. Pygidium with no yellow, which is characteristic of this species. × 9.

Fig. 2c. Labrum, showing characteristic dark spot in centre. × 5.

Fig. 3. *C. tasmaniensis,* a variation in the marking of the female. Natural size.

Fig. 4. *Campsomeris carinifrons* Turner, female. Natural size.

Fig. 5. *Scolia formosa* Guer., female. Natural size.

Fig. 6. *Campsomeris ferruginea* Fabr., female. Natural size.

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2 b

2c

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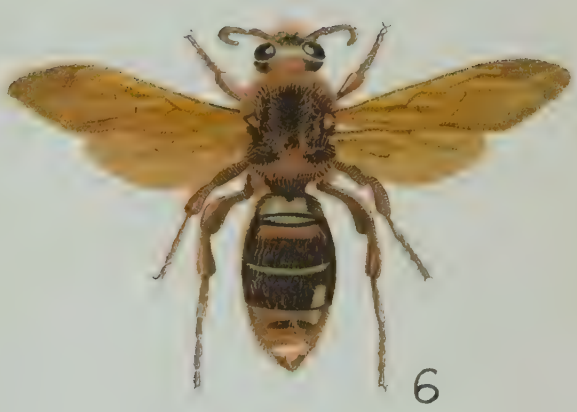

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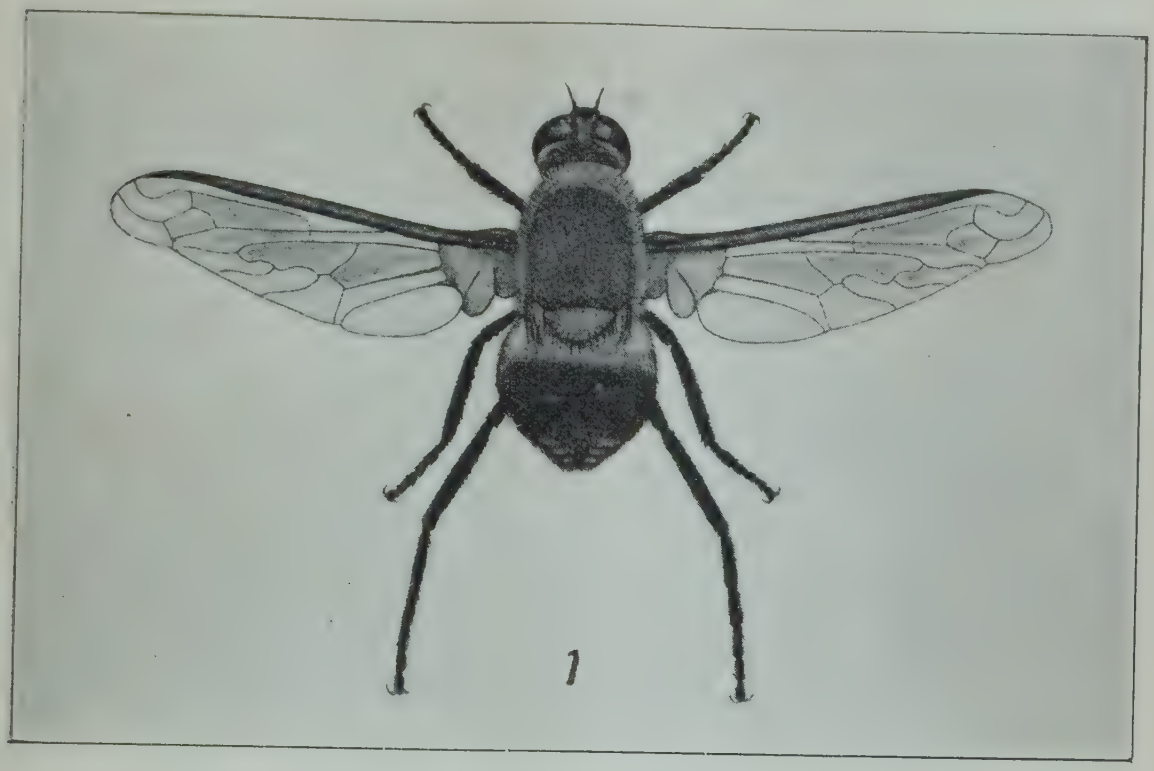
Del. E. Jarvis.

PLATE VII.—HYPERPARASITES OF SCOLIID WASPS.

Fig. 1. *Hyperalonia funesta* Walker. × 2.

Fig. 2. A pupa of one of these flies. × 2. (After Davis.)

Fig. 3. A Rhipiphorid beetle. × 3. (After Davis.)



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TOBACCO CULTURE—II.*

BY M. P. MARTIN, Chief Controller, Tobacco Industry, Madagascar.

Translated by MAJOR A. J. BOYD.

The latest "Bulletin Economique," published by direction of the Governor-General of Madagascar, contains a very informative article on Tobacco Culture in Madagascar and on the East Coast of Africa. Methods of cultivation and after treatment of the tobacco crop, which will interest Queensland growers, are exhaustively set out, and from this article the following interesting notes have been abstracted. The first instalment appeared in the January Journal.—Ed.

TEXTURE OF THE SOIL.

Compactness.

The compacity, that is to say, the number of seedlings planted per acre, has a very great influence on the final quality of the tobacco. If, in the field, the plants have been placed too far apart, the development of the leaves certainly attains its maximum, but the parenchyma—that is, the soft or spongy substance—becomes thick and the rate per cent. of nicotine sensibly increases. The leaves harvested are heavy, but coarse, and are in consequence of a reduced commercial value. If the compacity per acre is too great—*i.e.*, if the plants have been too closely planted—each one may, while showing apparently real good qualities, have actually not developed sufficiently.

To obtain the maximum return, the number of plants set out per acre must oscillate between very narrow limits. But what should be these limits? This is an unknown quantity yet to be determined. Meanwhile, until this has been done, I advise, for lands slightly heavy and very rich, capable of giving good returns, to space the plants in rows about 5 feet apart, and about 4 feet apart in the rows—about 12,000 plants per acre. In the case of light soils of medium fertility, the distance between each row a little less than 4 feet apart, and about 3 feet apart in the rows, making about 17,000 plants per acre.

WEEDING, DOUBLE PLOUGHING, EARTHING UP.

I think it is needless for me to dilate upon the advantage of weeding, double ploughing, and earthing up. Besides the destruction of noxious weeds, second ploughings are immensely useful, during a dry season, in delaying the desiccation of the soil and thus by keeping the land fresh, enabling the normal growth of plants which would otherwise suffer from want of water which would prematurely be the cause of signs of premature maturity. The earthing up consists in surrounding the base of the stem with a good heap of soil. Its beneficial effects are indisputable.

As soon as the plants have attained a sufficient height, the two seminal leaves are twisted off. Then a portion of the soil is drawn up around the stem. The adventive roots, which strike out almost immediately near the wound caused by taking off the leaves, develop rapidly in the upcast soil and prepare an increase in the crop which pays largely for the process of earthing up.

PRUNING, TOPPING.

The leaves on a naturally growing tobacco plant are not all of the same size or the same chemical composition. Their individual values are consequently very unequal. On examining separately each leaf, from the top or bottom, one becomes aware that their dimensions, length, and breadth, increase progressively to obtain a maximum height, then they decrease rapidly and bear no more but a few small leaves at the very top, the size of which deprives them of all commercial value.

As to the thickness of the parenchyme, it has been shown that there is an increase starting from the base to the top. The percentage of nicotine increases under the same conditions, and in strong proportions. Thus it is that in certain varieties the leaves near the soil, or lower leaves, may not contain more than .50 per cent. of nicotine, the percentage of alcaloids will increase from leaf to leaf to reach 2 per cent. towards the middle of the plant, 4 or 5 per cent. in the last leaves of marketable size, and a rate per cent. still higher in the by-tongued leaf, located under the flower. If the plant of tobacco is allowed to grow freely, the ground leaves will show a feeble development and consequently a very poor weight (500 to 600 leaves to a kilogramme), whilst at the top of the stem there will be leaves too small to have any commercial value, besides which they are too highly charged with nicotine.

**Bulletin Economique de Madagascar.* La culture du Tabac a Madagascar (Extraits du rapport de M. le contrôleur principal Martin, des manufactures de l'Etat en mission à Madagascar).

Pruning is an operation which consists in destroying at the base of the plant, besides the two seminal leaves which should have been removed during the process of earthing up, two or three leaves of little value because of their want of weight and almost entire want of nicotine. It is effected by breaking at several inches from the stem the petiole of the leaves to be done away with, and abandoned eventually on the field.

Topping is the operation by which the stem is divided near the summit in such a manner as to retain, on each plant, the exact number of leaves which will admit of obtaining the best returns in weight as well as in quality. The operation is a somewhat delicate one, but it really presents no difficulty. In fact, it is sufficient to separate, with due care in order not to injure them, the leaves composing the terminal bud and to cut off with the finger-nails or some simple instrument, on the plant, the upper part of the stem which bears the floral bud, and the three or four leaves situated immediately below it, which are very rich in nicotine and would only obtain a small size. This being done sufficiently early, topping allows the sap to afford nourishment only to the saleable leaves, which will thus attain the maximum development.

If the number of leaves thus preserved on each plant is considered insufficient—that is to say, if the stem has been divided too low—each leaf attains a strong development, but the tissue composing it is thick and coarse, therefore of inferior quality. Furthermore, whatever may be their individual dimensions, the weight of the whole of the leaves per plant will be poorer than it would have been if the number of leaves saved had been greater.

If, on each topped plant, too many leaves are allowed to remain—that is, if the stem has been cut off too high up—each leaf will possess the required fineness and quality, but the total will not weigh more than it would have yielded had a few extra leaves been suppressed.

As a résumé to enable me to make myself understood, I will say that each plant is capable of producing, with a proper number of leaves (say x) the maximum of weight and quality. If, after topping, the number of leaves retained is absolutely less than x, there will be a loss of quality and weight. If, on the contrary, on each plant a number of leaves has been retained superior to x, the weight and quality of the product harvested remain invariable. The gross yield will neither be greater nor less, but we shall have to deal with a greater number of leaves, and hence there will be loss of time and money. This loss, not being in all cases very light, we arrive at the conclusion that it will be more worth our while to top too high than too low. In other words, it is more worth while to retain on each plant a number of leaves more than x, rather than a less number.

But what is this number x of leaves to be preserved? It is materially impossible to give it a decided fixed value. It must vary according to the variety cultivated, and even for the same variety, according to the soil and locality where planted. It is thus that a tobacco plant will yield on any plantation its maximum return with nine or ten leaves, whilst another plant from the same batch of seed and of the same sowing, but transplanted elsewhere, only reaches its maximum with seventeen or eighteen leaves, perhaps more. These two maxima are not similar in any respect, and may vary in large proportions. M. Martin here cites many examples of the similarity and variations of the tobacco plant in France, Paraguay, and elsewhere, and concludes this item of his paper as follows:—"One can understand, under the aforesaid conditions, the impossibility of fixing for each plant, and even for each variety, a fixed number of leaves to be retained per plant. It is for the planter to determine—the rest is easy."

PRODUCTION OF SEED.

Some indigenous varieties of tobacco develop a splendid foliage and certain qualities highly appreciable; the types of a fixed character must be determined, and must be classified, and the qualities of each must be carefully judged, and by cultivation to develop those which appear likely to give the best return.

Seeds of foreign origin may possibly for the first year show satisfactory results, such as the physical appearance of the plants, and the kind of aroma; still, when cultivating the second generation, the whole of its original characteristics may disappear more or less completely. It follows that the highest yield of the first crop may diminish in considerable proportions in the second generation.

There is certainly a solution of this question—for instance, the establishment each year of experimental seed plots of such seeds—but I would only advise this course to be adopted for such varieties as present in a first sowing clearly superior qualities, enabling them to command a high price in the European markets. It is important to select such varieties as can be acclimatised without visible transformation, and a few of those which have for a long time in the country been showing such qualities as would suffice to render their cultivation largely remunerative. It is with

the object of drawing the attention of planters to the reproduction of these varieties as reproductresses, as the poor harvests of seeds, quickly brings on the crossing of the varieties.

Another matter of importance is the choice of, as plant mothers, the most vigorous kinds, and the most healthy, as certain diseases are capable of transmission by seed. Before starting to top the plants, the planter should look round his plantation and select the plants whose appearance presents the characteristics of the variety grown; such as the junction of the leaves with the stem, shape of the leaves, number and condition of the nerve system, being at the same time always careful to their fineness and to the size of the angle which they make with the median stalk or rib. The mother plants should be marked and allowed to grow freely.

When the seed capsules assume a chestnut colour the bunch is cut off and set away to dry, stem downwards to prevent the seeds falling out of the capsules. Nothing more need be done further than, when the capsules are dry, to crush them and winnow the husks from the seed. Tobacco seed will preserve their germinating power for several years if kept dry.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF DECEMBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING DECEMBER 1922 AND 1921 FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Dec.	No. of Years' Records.	Dec., 1922.	Dec., 1921.		Dec.	No. of Years' Records.	Dec., 1922	Dec., 1921.
North Coast.	In.		In.	In.	*South Coast*—continued:	In.		In.	In.
Atherton	7·35	21	12·12	6·42					
Cairns	9·19	40	1·97	10·26	Nambour	6·30	26	5·15	13·76
Cardwell	8·46	50	7·71	13·63	Nanango	3·71	40	5·19	13·11
Cooktown	7·09	46	1·54	7·97	Rockhampton ...	4·62	35	4·13	19·42
Herberton	5·66	35	6·08	7·27	Woodford	5·41	35	4·66	12·73
Ingham	7·21	30	5·85	9·55					
Innisfail	12 23	41	4·41	17·72					
Mossman	13·00	14	4·42	24·28	*Darling Downs.*				
Townsville	5·53	51	6·82	5·55					
					Dalby	3·09	52	1·80	9·10
Central Coast.					Emu Vale	3·58	26	4·35	6·52
					Jimbour	3·16	34	2·16	7·68
Ayr	3·58	35	5·94	9·09	Miles	2·54	37	4·16	6·02
Bowen	4·43	51	7·34	9·70	Stanthorpe ...	3·48	49	5·87	6·61
Charters Towers ...	3·51	40	6·12	3·50	Toowoomba ...	4·19	50	3·78	8·07
Mackay	6·89	51	5·86	13·38	Warwick	3·50	57	4·29	9 27
Proserpine	8 93	19	7·59	19·66					
St. Lawrence ...	4·49	51	11·16	18·01	*Maranoa.*				
South Coast.					Roma	2·34	48	5·30	4 89
Biggenden	4·47	23	3·60	12·50					
Bundaberg	4·73	39	4·79	15·89	*State Farms, &c.*				
Brisbane	4·96	71	4·59	11·33					
Childers	5·30	27	8·67	15 45	Bungeworgorai ...	2·45	8	7·64	3 81
Crohamhurst ...	6·83	30	8·96	14·49	Gatton College ...	3·45	23	3·08	7·60
Esk	4·35	35	6·22	11·85	Gindie	2·61	23	3·98	2·16
Gayndah	3 92	51	4·26	11·11	Hermitage ...	3·03	16	3·85	7·47
Gympie	5·73	52	6·30	11·14	Kairi	7·43	8	4·06	5·78
Glasshouse Mts. ...	6·72	14	6·44	11·67	Sugar Experiment Station, Mackay	8·25	25	4·85	14·50
Kilkivan	4·28	43	3·94	12·33	Warren	3·78	8	4·19	10·05
Maryborough ...	4·65	51	6·38	11·23					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for December, 1922, and for the same period of 1921, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
State Meteorologist.

EMPIRE COTTON GROWING.

The world production of cotton per annum is approaching 20,000,000 bales (of 500 lb.) of which the United States, in normal years, supplies about 70 per cent. The principal industries in Great Britain are those connected with cotton manufacture in its various phases, requiring about 4,000,000 bales of raw cotton per annum. The present position is that the world's consumption of cotton must increase, the United States supply may decrease owing to the boll weevil trouble and labour difficulties, consequently new sources of supply become a matter of immediate importance. Cotton-growing is not so simple and easy as some people think, but there is no doubt that, with organisation and scientific methods, the Empire could supply a large proportion, if not all, of its own cotton requirements, and, in particular, Australia may become a great cotton-producing country.

The above considerations are well known to cotton-growers and manufacturers, but in the public mind there is some confusion as to the various organisations which have been formed to develop cotton-growing within the Empire. The following particulars as to these organisations, together with some notes as to the cotton produced, supplied by Mr. S. W. B. McGregor, Senior British Trade Commissioner, will be of interest.

British Cotton Growing Association.

The British Cotton Growing Association was formed in London some years ago and has done excellent work in promoting the growing of cotton, largely in Africa. This association works on commercial lines, and in developing new areas will handle the cotton when grown, or in other words, will gin, bale, and dispose of the cotton on the Liverpool market.

The increasing importance of the subject led to the appointment by the Board of Trade, London, of an Empire Cotton Growing Committee, which, after nearly three years' investigation and inquiry, issued its report in October, 1919.

Empire Cotton Growing Corporation.

As a result of the above committee's labours the Empire Cotton Growing Corporation was established by Royal Charter in November, 1921. The general policy of the corporation has still to be determined, but apart from exploration and the investigation of new pioneer schemes, the principal work of the corporation will be of an educational character. Facilities will be provided to enable men with training to take up graduate studentships and readerships at British Universities in special cotton subjects. When trained, these men will be attached to the agricultural departments of the Dominions and Colonies. This work is considered of great importance, as any development of cotton-growing on a large scale must be on scientific lines and there must be a better supply of men competent to give advice and assistance to native and other growers.

It is proposed to obtain funds for the corporation by means of a compulsory levy on British cotton spinners of 6d. per bale of 500 lb. of cotton. A Bill to this effect was introduced into the House of Commons in July last, but failed to pass before the session closed.

The Empire Cotton Growing Corporation will work in close co-operation with the British Cotton Growing Association, the Earl of Derby being president of both bodies.

Australian Cotton Growing Association, Limited.

The Australian Cotton Growing Association, Limited, was registered in London in 1920. The Australian Cotton Growing Association, Queensland, Limited, which is a subsidiary to the London company, was registered in Brisbane in April, 1922, with a capital of £200,000. The latter is now in process of reconstruction to permit of greatly increasing capital and extension of its activities, which will include the ginning and marketing of Australian cotton and the establishment of oil mills.

Progress Made.

The estimated amount of cotton grown in new fields in the British Empire, mainly in Africa, between 1913 and 1921 (in bales of 400 lb.) was:—

1913 ..	72,800	1914 ..	82,350	1915 ..	75,200
1916 ..	78,800	1917 ..	72,600	1918 ..	54,900
1919 ..	79,600	1920 ..	105,800	1921 ..	164,000

The progress made is largely, if not wholly, due to the activities of the British Cotton Growing Association.

Notes on the most important new fields, in order of the quantity produced, are as follows. The cotton production is given in bales of 400 lb. and is for the year 1921.

Uganda.

Area, 110,000 square miles; population, 3,000,000. The Government impose a revenue tax of £1 per bale. Possibilities for extension of cotton-growing considered good. Production, 81,300 bales.

Sudan.

Area, 1,000,000 square miles; population, 3,500,000. Principally grown under irrigation. Quality good. Scheme in hand to cultivate 500,000 acres, estimated to yield 400 lb. cotton lint per acre. Railways required for transport. Production, 40,000 bales.

Nigeria.

Area, 336,000 square miles; population, 17,000,000. Production, 32,000 bales.

Tanganyika Territory (Formerly German East Africa).

Area, 348 square miles; population, 4,000,000. Germany considered possibilities of cotton-growing very favourable. Production, 7,500 bales.

West Indies.

Produce the finest Sea Island cotton grown in the world. The islands are small in area, and as there are other industries the possibilities of increasing the supply are limited. Production, 3,500 bales.

Nyasaland.

Area, 40,000 square miles; population, 1,250,000. Cultivation on the dual system, partly by European planters and partly by natives working their own land. Transport difficult and railway extensions essential. Production, 2,800 bales.

South Africa.

Cultivation of cotton arousing interest amongst farmers in certain districts of the Union of South Africa and Rhodesia, but is impossible in many of the provinces. In North and South Rhodesia, Northern Transvaal, Natal, and Swaziland, the farmers are successfully growing small quantities of cotton, and the prospects are considered good. Production (South Africa and Rhodesia), 2,000 bales.

Australia.

Estimated that there are 30,000,000 acres in Queensland capable of producing cotton, but some doubt exists in Lancashire as to whether the cotton industry, that depends on abundant and cheap labour, can maintain itself in Australia. Production, 800 bales in 1921, and 2,500 bales in 1922. Estimated production, 40,000 bales in 1923.

Kenya Colony (formerly British East Africa).

Area, 200,000 square miles; population, 4,000,000. Prospects uncertain. No production.

Mesopotamia.

Area (British Mandatory sphere), 150,000 square miles; population, 2,850,000. Soil and climate similar to Egypt. Great possibilities, and it is believed with a sound irrigation system about 1,000,000 bales per annum could be produced.

India.

Area, 1,803,000 square miles; population, 315,000,000. Production last season over 5,000,000 but quality only suitable for coarsest yarns and of very little use to Lancashire. Possibilities of improvement are enormous.

Ceylon.

Area, 25,840 square miles; population, 4,500,000. A little cotton grown from time to time, but for various reasons no progress made.

Other.

Cotton is also produced in small quantities in Cyprus, Fiji, Malta, Turks, and Caicos, but with the exception of Fiji is harsh and short stapled.

NOTES ON THE CITRUS ORANGE BUG *(ONCOSCELIS SULCIVENTRIS.)*

Subjoined is a preliminary report on observations made and investigations carried out in the Blackall Range area by Mr. Henry Tryon, Government Entomologist and Vegetable Pathologist, from the 15th to the 17th of January, 1923. This report was furnished by Mr. Tryon to the Under Secretary, Department of Agriculture and Stock (Mr. Ernest G. Scriven) for transmission to the members of the Mapleton Local Producers' Association, at whose request Mr. Tryon made the visit to the citrus groves on the Blackall Range and of which this report is the outcome. As the subject is one of general interest to fruitgrowers at this juncture, the observations and conclusions of Mr. Tryon have especial relevancy.—Ed.

Locality.

For the purpose of the inquiry the following typical orangeries were visited—all situated in the Flaxton area—viz., those occupied by Mr. H. Morris, Mr. J. F. Power, Mr. J. Melver, Mr. R. Morris, Mr. G. Still, Mr. A. D. C. Hetherington, and Mr. R. B. Shaw. (NOTE.—It was intended to include Mr. Dickson's orangery, where infestation during 1922 had been so pronounced, but Mr. J. Dickson was temporarily absent from the district.) Whilst local inquiry was restricted to these areas, it is not to be inferred that the presence of the insect does not extend throughout the Mapleton, Flaxton, and Montville area.

Insects Present.

These, so far as the usually recognised phases are concerned, were nearly all in the adult state—bearing organs of flight—as may be inferred from a description of a small collection obtained on the day preceding our visit. This comprised eighty-eight adults and eight larvæ representing three different stages of growth. However, the percentage of the larger larval forms was generally much below 8.3 per cent. as shown by this. With reference to the numbers, it was an uncommon occurrence for there to be as many as twenty bugs upon a tree; but by actual count growers had found, at an earlier period in the season, as many as 400 on small citrus trees and 1,400 on larger ones. The present relative decrease in numbers was evidently to be accounted for in part by the efforts at bug-destruction that had been systematically pursued. The two sexes were about equally represented in the insects present on any tree.

Insect Occurrence.

The adult insects occurred principally in clusters from two to ten, rarely in larger number. Clusters of eighty are said to have been earlier noted, but often solitary bugs, especially females, were noticeable. These insects, especially if solitary, readily took wing on disturbance after falling a few inches, from 6.30 a.m. onwards, and as long as sunshine prevailed.

They occurred for the most part closely united male and female, and where any group contained an uneven number of the respective sexes the odd insect might be male or female. The adult insects no longer attacked the developing fruit, even where this was still quite small (but already hard). They were confining their attention to the tender shoots. These, subject to the injury occasioned by the insects' penetrant and sucking mouth-organs, first curled over, and their young and small leaves shrivelled up and darkened, as did also the stem itself. It was to be inferred, also, from features present, that whilst so feeding they did not infrequently communicate disease—a fact that would suggest that some forms of citrus "die back" may originate in their habit. It was also to be observed that, apart from the former injury to the young fruit and its consequent dropping, an unseasonable flush in vegetative growth had often resulted in a manifestation more recent, however, of the same phenomenon.

It was noteworthy that the female bugs engaged in their amours—that were of long continuance—did not desist from feeding, and that they invariably settled themselves higher on the shoots than their consorts where the tissue was more succulent. (NOTE.—These facts are not without bearing on the question of the most expedient method of capturing the adults at the time of the year covered by this inquiry.)

Egg Production.

It was found that the ova had already grown to a large size in the interiors of the female bugs before these were visited by the males. Also that they are associated with large nutritive cells that appear to be largely absorbed before these eggs are actually fertilised. This suggests—as is actually found to be the case—that they are capable of hatching very soon after being laid.

Egg-deposition.

After evidently some days of what we may term "wedded life," the adult Orange Bugs separate and disperse. However, the females, already ready to lay their eggs, do

not travel far from the shoot on which this has been spent, often but a foot or two. In fact, individual female bugs, where several have been clustered together, may remain side by side and lay their eggs upon the same leaf. (NOTE.—This fact has a bearing on the successful search for the egg-batches.) In selecting a site for the eggs, a shoot is taken on which the foliage, although still pale and of a green, delicate nature, has about attained its full size. Exceptionally, however, they are deposited on old leaves, and not on these young ones. They are in by far the larger number of instances placed on the under leaf surfaces, especially where an adjoining leaf is almost opposed to this beneath. Their deposition is a matter of minutes only. Almost invariably each female lays fourteen eggs—only once have we met with fifteen. Moreover, with almost similar frequency, the eggs are laid side by side in a batch with a uniform arrangement—viz., a row of four in the middle, three on each side of this, and two again outside each of the latter rows. Exceptionally two batches may be laid side by side by two female bugs so as to form a single egg-mass. These eggs are spherical, glossy, pale leaf-green, and measure 2.5 mm. in diameter. When hatched the empty eggs are colourless and glass transparent.

Production of Larval Bugs (First Stage).

When laid (as we have seen) the embryo-bug is already well advanced in growth. Within a few days its limbs and the antennæ with their now red tips can be seen through their transparent shells. When eight to nine days have elapsed from the time of laying, hatching takes the young larval bug with its limbs still folded, pushing open a small circular convex cap that separates from the remainder of the shell along a line of small pores. These larval bugs are of a delicate green colour and of a bright hue, oval in outline and lowly convex. They measure 5 mm. x 3.5 mm. When hatched out, they remain side by side upon the under leaf surface, and apparently feed little, if at all. With the slightest disturbance, which may fall short of shaking, they voluntarily detach themselves, fall to the ground, and crawl about in different directions, to be soon lost if herbage is at hand. This is the stage at which, as it has been stated, the orange bug arrives on the Blackall Range, the adult insects and these diminutive larvæ, that are said to be met with during January and the succeeding month or two. Then it is said they quite disappear and are not to be met with, not a single bug, during the ensuing winter—two or three months (H. Morris). In the course of this brief inquiry, however, it was practicable to point out and demonstrate that there was a second larval stage that shortly succeeds the first, with habits that might throw light on this apparent temporary disappearance.

Within a few days, the Orange Bug larvæ of the first stage cast their skins; and this happens even when they have so far not partaken of any food. This moult, however, gives rise to a larvæ (second stage) very different both in appearance and habit from that representing the first stage from which it has been naturally derived. Though still pale-green, its body is now much flattened as if "beaten out," narrows somewhat towards the head, instead of being regularly oval, has the thoracic segments defined above by angular instead of curvey lines, and has the antennæ red-tipped (instead of black), whilst these organs placed together are now directed straight forward. The upper surface also is dull instead of being glossy, and finely wrinkled and areolate instead of being smooth. It now measures 7 mm. by 4.5 mm.

For a brief period, fourteen of these second-stage larvæ may congregate side by side on an under leaf surface, taking the place of the fourteen first-stage larvæ they have arisen from. These individuals may now move off one by one, dispersing themselves over the tree on which they happen to be, their movements being relatively rapid. As thin as paper, they now adhere flatly to their support—the under leaf-surfaces—and their colour harmonising with that of this, they are with difficulty only discerned on a tree, even if it be a tree but 18 inches high on which they occur. Further, being quite unlike (as we have seen) the larvæ of the first stage in this respect, not only do they not readily detach themselves voluntarily, but rarely can they be caused to drop to the ground from the branches of the tree on which they occur on these being suddenly banged. In fact, our efforts in this direction have only enabled us to secure individual second-stage insects, when, on the other hand, many larvæ of the first stage have been thus obtained, although we have known that the former have largely outnumbered their younger associates. (NOTE.—No statement can be made as to the length of the period passed by the Orange Bug in this second-stage phase of life. It is a matter that is being experimentally inquired into.)

Occurrence of Eggs and Larvæ of First Stage on Trees.

On a single small orange tree (estimated age ten years, H.T.) occurred twenty-nine batches—all of those save one consisting of fourteen—a total of 405 eggs. This number probably fell short of the actual occurrence, as it was impracticable in the brief period available to discover nearly all those present. Further, some mature female insects were also present to furnish additional eggs.

This quota of eggs was furnished by a tree in an orangery from which all the bugs discoverable on systematic "beating" or "tapping" have been removed, when for the most part in the larval stage, and although the number found, or estimated to occur, was evidently in excess of those present on the trees of the orangery generally, it illustrates:—

(1) The extent to which in early January orange trees, older ones especially, may harbour eggs; and

(2) That either the removal wholly of orange bugs by "beating" or "tapping" is not practicable, or, as is much more likely, "clean trees" are liable to be bug-infested from without, when their systematic "cleansing" is not generally undertaken by citrus growers through co-operative effort.

Of these twenty-nine batches the eggs of three had already hatched on 16th January, and from data to hand all would have done so on or before 25th January.

In other trees the proportion of egg-batches that had already hatched was larger.

Flying Powers of Adult Insects.

During the period occupied in the inquiry the conditions of permanent sunshine and warmth were very favourable to the exercise of the flying habit by the adult Orange Bugs. When disturbed, and often on slight disturbance only, they dropped a few inches only and then took wing. Thereupon they not only would at times repair to a neighbouring tree, but also fly far afield. Specific instances of their moving through the air far overhead in a definite direction until beyond the reach of vision occurred. This observation confirming previous ones suggests:—

(1) That the method successful in capturing immature Orange-tree Bugs as ordinarily practised requires to be greatly modified if that of the adults is aimed at; and

(2) The readiness with which an infested orangery may become a source of infestation for one originally non-infested or rendered so by special effort.

Larval or Nymph Orange-tree Bugs and Tree Attachment.

The insects show a varying degree of closeness in their adherence to their host plants, and corresponding difficulty with which they are capable of being dislodged according to the stage of life in which they occur. Thus of the five of those preceding the adult stage, they are detached most readily in their first green stage, and with greatest difficulty during the second and fifth stage (final)—*i.e.*, the one before that of the adult one is attained.

Native Source of Infestation.

It has been suggested that, insomuch as the Orange-tree Bug (*Oncoscelis sulciventris*) is a native insect and has originally proceeded from some native tree—

(1) That its indigenous food plants comprise not only our species of Wild Lime or Wild Orange (*Citrus australis* and *Citrus australasiea*), but the other species of *Rutaceæ* that include these also; and

(2) That each year this injurious insect forsakes the orangeries in its hosts to repair to the scrubs that contain these trees, to return once more to the orangeries with the advent of spring and reinfest them.

The latter suggestion is not in harmony with the observations made by me and the testimony of local growers. In fact, a member of the Citrus Council, Mr. H. Morris, who probably has given more attention to the Orange-tree Bug than anyone whom I have had the privilege of meeting, goes so far as to state that—

"We don't see the fully developed black bugs until the beginning of December, or, it may be, until the latter end of November, their occurrence then being preceded by wingless larval insects or nymphs."

On the other hand, it would appear certain that the insects, finding a congenial home in the orangeries and all there that they require for their sustenance and life generally, not only maintain the original colony or colonies, apparently usually small in some cases, but yearly increase in the course of natural development until eventually their numbers (they having no formidable enemies) are beyond conception so to speak.

With regard to native host plants, a survey of a small native scrub, containing both citrus and other indigenous (*Rutaceæ*) plants, failed to bring to light a single Orange-tree Bug, and their occurrence elsewhere, even on native *Citrus* spp., as judged by former observations, is occasional only. Mr. W. B. Petrie, of the Forestry Department, whose knowledge of Queensland scrubs, scrub trees, and the more obvious insect associations of trees is generally recognised, had indeed stated that

he has never yet seen the Bug on a native citrus, although an insect resembling it, and that may be the *Oncoselis** (but still to be identified) he has encountered on *Pentaceras australis,* Hook-fil (*Rutaceæ*).

*NOTE.—An insect that, when adult, closely resembles *Oncoscelis sulciventris,* and is named *Stilidia indecora* has been confused with it, even by entomologists.

This conclusion points to the urgency of procedures that would not otherwise be even expedient, *i.e.*—

(*a*) To make war on the insects whenever they appear in an orangery, or indeed on an isolated citrus tree, even when few are present, and no noticeable ill-effect is traceable to their presence. As the outcome of an opposite course of action, suggested by the theory of an annual visitation, may be cited the most grossly infested orangery in the Blackall area (that there is no occasion to specify here) where—as has been reported in the Press—insects during the latter end of 1922 were collected in kerosene tinfuls. Herein they occurred in the previous year, in far less numbers, and were allowed to live and breed unmolested then, on the understanding that there might be no recurrence in 1922.

On the other hand, continued systematic measures of repression during 1920, 1921, and 1922 on a neighbouring orangery has greatly reduced the numbers there. And, as

(*b*) A second procedure to regard every infested orangery or citrus tree as a menace for the succeeding year to orangeries or citrus trees still unvisited by the insects.

Citrus, Relations of Orange Bug.

The insect was observed—as already elsewhere—on all the kinds of citrus in cultivation—including not only oranges and mandarines proper, but also lemons and citrons. Possibly, further inquiry might discover a predilection on the part for certain of these.

NATURAL ENEMIES.

Being one of those who earliest dwelt on the important role served by natural enemies in controlling insect pests (*vide* Tryon, H., Insect and Fungus Pests, I. 1889 *passim*), the question of the extent to which these were operating in the district received special attention.

Egg Parasites.

I found not a single instance of the eggs of the insect being parasitised, notwithstanding several thousands were examined. This was surprising, since it had come under my notice that, in the case of another large Orange-tree Bug, equally injurious elsewhere to citrus—the "Horned Green Bug," *Biporulus bibax,* Breddin; a small hymenopterous insect bred in the ova, and thus consumed their contents. However, a small percentage of the eggs in some egg-batches had failed to hatch, and these had either collapsed or developed a brown colouration; but in this case mere natural death seemed to have supervened.

Predatory Insects.

Two other heteropterous insects were found preying upon the Orange Bug (*Oncoselis sulciventris*). These insects insert their mouth organs in their living victims, in the part usually corresponding to the neck, and gradually extract their blood, just as the latter have been drawing upon that (the sap) of the citrus trees on which they subsist. These natural enemies are species of the bug-genera Asopus and an ally.

However, both these predatory bugs were of exceedingly uncommon occurrence at the time of the visit. This fact, and the circumstance that a single Orange Bug appears to provide sustenance for a single individual enemy for days, is an indication that their services in repressing the latter insect were insignificant.

Birds.

(*a*) *The Drongo* (*Chibia bracteata*).—A bird of medium size, of a dark colour, the plumage having a decided sheen, with a fork tail and red eyes, that I originally described as an enemy of the noisome insect under consideration, was present, but in far too few numbers to exert much influence in controlling it. This is a usual denizen of the scrubs and is being reduced in numbers with their disappearance.

(*b*) *Dollar Birds* (*Eurystomus pacificus*).—This exclusively insectivorous bird was seen in the orangeries under circumstances that would suggest that it was capturing Orange-tree Bugs, but I have no direct evidence. I was not disposed to

shoot one in search of this—*i.e.*, of its capturing any—nor does my previous inquiry into its dietary favour the view that it preys upon the insect in question.

(*c*) *Shrike Thrush* (*Graucalus melanops*).—This bird also present was pointed out as one that feeds upon the Orange-tree Bug under consideration. The remarks under Dollar Bird will apply here. It is the local "Blue Jay."

(*d*) *Quail.*—These birds, paired and with eggs, were found in two orangeries. From my knowledge of the habits of these it would appear that they would prey on the bugs, especially in their earliest green stage when these insects are so readily induced to precipitate themselves to the ground. As, however, the species of quail referred to nests in herbage it is difficult to realise that is can accomplish much in this direction in orangeries kept clean, as should be the practice.

Fowls.

(*e*) It was surprising to note with what avidity these fed upon the insect when brought to the ground—not excepting the adults. In fact, it was observed that in Mr. H. Morris's orangery some of these birds would dog one's footsteps as one walked amongst the trees and contend for the insects that had been caused to fall. It is a matter for consideration how far this habit is general in fowls and possible of being availed of.

Disease.—Presence not noted.

Note.—From this survey, it will appear that the more formidable of the natural enemies that usually very materially destroy harmful insects of this bug kind are absent at present from the district, and cannot be regarded as a factor in controlling the numbers in which the present one occurs. At the same time this absence, together with an indisposition to take any steps to cope with the insect, even when occurring in injurious numbers, that has characterised the attitude of all but a few growers until recently, are the chief explanations to account for the formidable bug population infesting so many of the orangeries of the district with the evils attending its presence. It is being made a matter for consideration with us as to how far this absence may be remedied.

CONTROL MEASURES.

At this early stage in the investigation, control measure can only be generally indicated, as it was found that our visit was not suitably timed for the prosecution of the necessary experimental inquiry, although the means for conducting this had been secured.

Eggs.

These are very difficult to destroy; the nature of their shells renders them almost impervious to fluids, and their spherical shape and polished exterior serves to shed any fluid sprayed upon them. Ones that had been coated with lime-sulphur have been found to be still alive. Further, the fact that the batches occur for the most part on the under leaf-surfaces principally of young leaves, and although really numerous at times (but always very few indeed as compared with the number in which leaves constituting the entire foliage occur), it is doubtful, even if our experiments did indicate any effective spray, its use would be economically justified, especially as the deposition of these eggs may extend in the case of any one tree over several days at least, and, therefore, more than one application would be required for their destruction.

No great difficulty has been experienced in finding these eggs, although always leaf green, and added experience would no doubt lead to further efficiency in this respect. Every batch of eggs destroyed accounts for fourteen young bugs killed also, as usually 100 per cent. of these hatch out. It may be then, that there will be special circumstances when bug-egg collecting will be fraught with material results, even if promoted by the offer of a small bonus to meet the cost of the undertaking.

Early Larval Stages (First and Second).

Stage I.—The young larval described previously may be readily killed by any of the ordinary contact remedies if once brought in relation with them. However, except for this fact, the remarks made under "Eggs" will apply. But, of course, *their* collection is out of the question. Moreover, the difficulty of reaching them is enhanced by the fact that the very least disturbance causes them to voluntary precipitate themselves to the ground. As they occur upon the outside of the trees, striking these with branches or any of the methods used in bringing down older larval Orange-tree Bugs might be availed of, especially if the ground beneath the trees were kept bare of herbage. The results following such a course, if alone undertaken, would, however, not appear to be likely to be very material in subduing the pest.

Stage II.—During No. II. Stage it is unlikely that any process can be brought to bear on the destruction of the insect. It can with difficulty be caused to drop, if at all, and it occurs distributed over the entire tree, and is small and most inconspicuous.

Later Larval Stages (Third and Fourth).

It is during the third and fourth life phases of the insects' growth when still young and not exhibiting either wings or wing-covers that measures of control can most effectively be entered upon. Then the Orange-tree Bugs are conspicuous objects by reason of both their size and colour—yellow and yellowish-red—and they readily fall on the trees being "beaten" or "banged."

The effectiveness of any contact spray diminishes as they grow older, and their skins become less pervious to this class of insecticides, so also with regard to measures that may be termed mechanical. The older the insect is then, with respect to these stages, the greater is the tenacity with which it clings to its host, and the greater the corresponding difficulty in bringing it to the soil after releasing its hold. When oldest it is of a bright-pink colour.

The insect was practically absent at the time of this initial inquiry, and so was not available for figuring in tests involving the use of special reagents that were at the time at our disposal. It is, however, very desirable to ascertain the efficacy of insecticides containing Derrine, and steps had been taken to already to do so then.

This investigation has to be, therefore, unavoidably postponed.

In the fifth larval or nymph stage, when the insect possesses conspicuous wing-covers of a green colour, much more convex or distended than before, it is then increasingly difficult to cope with, even by much mechanical means, as it is very tenacious, comparatively speaking, in its hold on the plant.

"Banging," "Beating," or Mechanical Procedures.

The efficacy of this procedure depends upon other conditions governing its successful adoption on the following requirements:—

(1) It must be conducted when the insect is the more readily brought down (*see* above, "Later Larval Stages"). Otherwise, if deferred, say, until the insect is already adult and endowed with wings, not only will poor results be obtained, but insects will be left to repair to neighbouring orangeries to those of the scene of operations, either forthwith or subsequently.

(2) The procedure must be carried out in such a manner as to occasion the utmost sudden jarring of the trees without in any way injuring them. This method is the one well known, generally speaking, to entomologists, and necessitates striking the branches one by one, climbing the trees for this purpose, if necessary.

(3) The possibility of preventing access to the trees on the part of the Orange-tree Bugs brought down must be prevented.

The Morris System.

In developing these requirements, and insomuch as the visit was not timed to admit of special experiments being entered upon, it will meet the purposes of this report if a system be described that has been elaborated, after much enlightened consideration, by Mr. H. Morris, who is almost singular in Blackall Range citrus growers in keeping in close contact with this office, and who was deputed to arrange the details of this local inquiry.

Mr. Morris has devised a special stout beater, measuring about 18 inches long, made of a certain tough wood. Nearly two-thirds of this is occupied with the well-shaped handle, somewhat curved, that balances the terminal part and admits of a good hand-grip. The terminal portion which is brought when beating in contact with the wood is squared, with one face, however, left flat, the others rounded off. Around this part of the beater is tightly fastened a piece of discarded motor tyre rubber for its entire length, the ends nailed in apposition, opposite the squared side. The rubber in passing over the latter, which admits of an air space, forms a sort of cushion which secures impact with the bark in striking with the avoidance of injury. The figure of the handle has reference to the position of the air-space. In practice, an operative climbs up inside the tree and suddenly bangs the leading branches, and then secondaries one after another, until all have thus received a shock. Of course, the soil beneath the trees should be bare to receive the insects that this action causes to be precipitated upon it.

Mr. Morris's scheme also provides for a device for preventing the fallen insects from climbing the tree trunks and repairing to their former feeding grounds as they are

wont to do, and also causing them meanwhile to congregate so that they can be scooped up and destroyed.

This is effected by placing a band around each tree at a few inches above the soil-surface composed of some special grease-proof paper, and on this grease itself is put after it is fixed in position.

This serves the purpose of causing the insects that have been brought down, sometimes as many as 800 from a single tree, to mass together after some time beneath it, as it is a barrier to their progress; and, thereafter, they may be scooped up with a piece of tin and dropped into a vessel containing lye or other lethal fluid.

Adult Insects (Winged).

These when congregated on the terminals of branches or in some such situations, especially when the sexes are together, cannot, of course, be captured in this manner. In capturing them I have recommended a net-like apparatus and a long stick padded at the striking end. The apparatus is composed of one "net" within another. The outer one may be of stout calico with the end capable of being opened by untying a string; the inner—shorter—one to be funnel-shaped and made of tin with the stem placed downwards, the outer edge forming the net margin instead of the usual ring. This, moreover, has a ferrule for a handle fastened on obliquely so as to admit of the mouth of the apparatus being held just under the little congregations of insects. These, on being beaten by the padded stick (or rather the end of the branch on which they occur being so treated), fall into the inner net and through the funnel into the outer net, whence they cannot escape. I have also suggested the possibility of destroying the adult insects under the circumstances referred to with boiling water (Mr. H. Morris on his part suggests steam as a modification), but neither of these (and both promise to be feasible) has yet materialised even to the experimental stage.

Use of Parasites.

Inability to discover any parasite at present associated with the Orange-tree Bug in the portion of the Blackall Range citrus-growing area examined, and therefore any controlling influence exerted by their agency, whilst pointing to the fact that the insect originally came to the district in a winged state from a scrub separated by a distance from it, too extended to be readily traversed by its foes of this description, and could therefore develop its inherent powers of increase to the fullest limits (hence its numbers), at the same time points to the expediency of investigating the *Oncoscelis sulciventris* in its native haunts—(1) with a view to the detection of such of its parasites as might be expected to occur there; and in so doing, if practicable (2) transferring them to the newly-colonised territory of their proper host, where, being confronted with the latter, a material lessening in the number of these pestiferous insects should result from their presence and habits of life.

Co-operation Effort.

The coping with this insect demands as a *prime consideration* concerted action carried out at one time on well-considered lines. Such a scheme I formerly devised for coping with the Sugar-cane Grub pests of the North, and whose adoption has been attended with such marked success wherever pursued. It is beyond the scope of this report to further enlarge on this necessity, but no effective co-operative work can be inaugurated without a leader in the movement possessed not only of enlightenment but with energy and enthusiasm. Such concerted effort can be seecured under the laws, but a well-conceived voluntary co-operative enterprise would, as experience in the above-mentioned connection indicates, far exceed any action that was enforced by the threat of penal provisions to meet the case of defaulters.

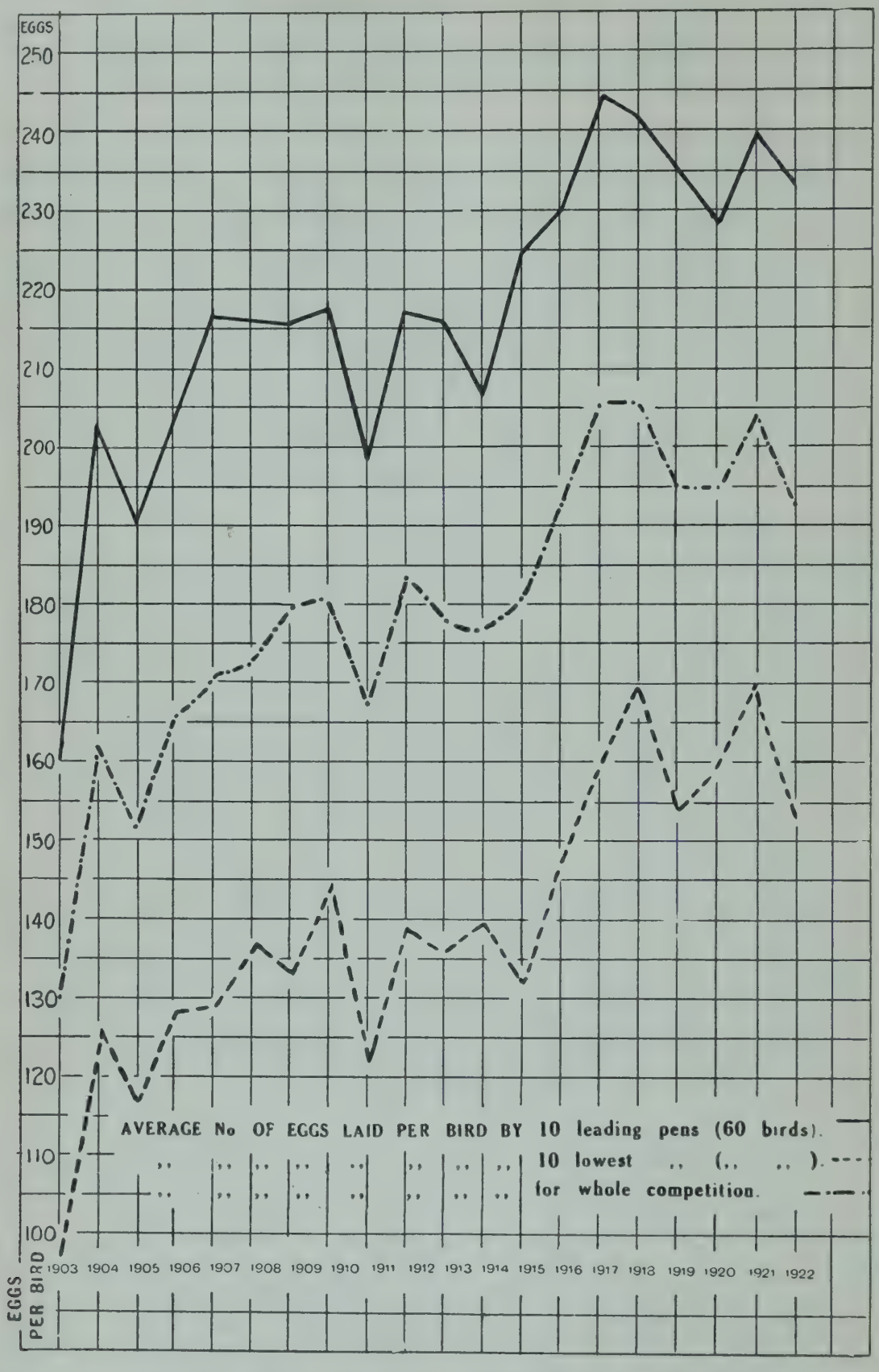
Obligations.

I have to especially confess my obligation to Mr. J. F. Power and Mr. A. Morris, of Flaxton, for very material assistance in prosecuting this inquiry, as well as to the junior members of my staff.

POULTRY SELECTION AND BREEDING.

This graph (from the "Agricultural Gazette of New South Wales") illustrates very clearly the excellent results to be obtained from careful selection and breeding. The diagram, which has been compiled from the records of the egg-laying competitions at Hawkesbury Agricultural College extending over twenty years, is self-explanatory. The full black line shows the average in each year of the 10 leading pens, totalling 60 birds—not necessarily the best 60 birds, as in the early years of the competition the birds were grouped in pens of six,

and it was not possible (as now) to pick out the 60 birds that actually laid best. For the same reason the lighter line shows the average of the lowest pens, but not necessarily of the poorest birds. The diagram shows up very strikingly the following points:—(1) The greatly increased egg-production of all sections—leading pens, lowest pens, and average for whole competition; (2) the average of the lowest



pens is now higher than that of the whole competition in the earlier years; (3) the average for the whole competition is now higher than the average of the leading groups in the early years. The most pleasing feature of the record is that the improvement, except for seasonal and other explainable causes, has been continuously progressive.

NATIONAL UTILITY POULTRY BREEDERS' ASSOCIATION COMPETITION, ZILLMERE.

Two thousand two hundred and thirty-five eggs were laid in this competition during the month of December, being an average of 18.625 per bird. There have been no cases of sickness in spite of the hot weather, but a few birds have been broody, thus reducing slightly the average score.

Pen No.	Owner.	Dec.	Total.	Pen No.	Owner.	Dec.	Total.
	WHITE LEGHORNS.						
2	A. Niel	28	233	30	A. S. Walters ...	17	173
29	A. S. Walters ...	21	224	36	Parisian Poultry Farm	22	173
43	J. J. Davies ...	27	223				
66	A. Cowley ...	25	215	48	M. J. Lyons ...	13	170
64	G. Trapp	26	211	17	R. Shaw	18	170
62	H. Sturman ...	24	207	18	R. Shaw	25	170
19	L. Andersen ...	16	205	57	M. Newberry ...	20	168
27	Oakleigh Poultry Farm	23	205	23	M. H. Campbell...	30	168
				41	G. Williams ...	21	167
7	J. Harrington ...	23	205	51	F. R. Koch ...	23	167
34	J. Purnell ...	25	205	56	W. H. Lingard ...	24	167
70	J. Hodge	27	202	37	Carinya Poultry Farm	23	166
72	Enroh Pens ...	22	200				
33	J. Purnell ...	12	200	73	A. F. Knowles ...	19	163
12	J. Potter ...	18	199	8	J. Harrington ...	20	163
77	Kelvin Poultry Farm	19	199	76	A. J. Bourne ...	17	160
				22	E. Stephenson ...	20	160
25	P. F. Adams ...	22	199	20	L. Anderson ...	21	160
61	H. Sturman ...	22	196	14	J. Hutton ...	23	155
63	G. Trapp	25	196	16	T. Flood	13	155
39	P. J. Fallon ...	25	195	82	E. C. Raymond ...	12	153
53	A. W. Ward ...	26	194	65	A. Cowley ...	16	149
68	R. D. Chapman ...	19	192	80	W. Bliss	24	148
79	W. Bliss	24	190	11	J. Potter	21	148
13	J. Hutton ...	26	190	5	Wambo Poultry Farm	20	146
44	J. J. Davies ...	24	189				
55	W. H. Lingard ...	22	188	81	E. C. Raymond ...	20	146
52	F. R. Koch ...	24	188	78	Kelvin Poultry Farm	25	144
47	M. J. Lyons ...	17	183				
24	M. H. Campbell...	20	182	31	R. H. Woodcock	19	142
58	M. Newberry ...	23	182	3	W. Becker ...	25	142
67	R. D. Chapman ..	24	182	71	Enroh Pens ...	19	139
10	P. Ruddick ...	24	182	45	H. Needs ..	16	138
46	H. Needs ...	24	181	15	T. Flood	16	135
49	R. Turner ...	23	179	59	C. Pickering ...	2	133
6	Wambo Poultry Farm	21	178	60	C. Pickering ...	9	132
				69	A. Hodge ...	11	128
40	P. J. Fallon ...	25	178	50	R. Turner ..	11	126
54	A. W. Ward ...	26	178	74	A. F. Knowles ...	0	123
26	P. F. Adams ...	26	178	75	A. J. Bourne ...	23	121
42	G. Williams ...	22	177	4	W. Becker ...	16	120
38	Carinya Poultry Farm	8	177	21	E. Stephenson ...	22	112
				32	R. H. Woodcock	17	108
9	P. Ruddick ...	17	174	28	Oakleigh Poultry Farm	0	107
35	Parisian Poultry Farm	20	174				
				1	A. Niel	13	17

NATIONAL UTILITY POULTRY BREEDERS' ASSOCIATION COMPETITION, ZILLMERE—*continued.*

Pen No.	Owner.	Dec.	Total.	Pen No.	Owner.	Dec.	Total.
			BLACK ORPINGTONS.				
96	R. A. Boulton ...	21	216	86	Kidd Bros. ...	14	155
92	C. C. Dennis ..	26	214	83	J. Hutton ...	5	154
88	W. A. Blake ...	25	213	102	Parisian Poultry Farm	12	150
107	E. Walters ...	14	197				
93	E. F. Dennis ...	18	194	84	J. Hutton ...	14	150
91	C. C. Dennis ...	24	189	109	Wambo Poultry Farm	16	148
108	E. Walters ...	23	188				
95	R. A. Boulton ...	19	187	112	A. Niel	26	145
105	H. Pearce ...	19	183	90	T. Brotherton ...	3	140
89	T. Brotherton ...	28	176	106	H. Pearce ...	12	140
101	Parisian Poultry Farm	18	174	99	L. J. Prichard ...	0	128
				110	Wambo Poultry Farm	13	127
103	J. Potter	20	171				
111	A. Niel	23	167	98	Enroh Pens ...	18	125
100	L. J. Pritchard ...	4	158	97	Enroh Pens ..	24	118
87	W. A. Blake ...	19	158	94	E. F. Dennis ...	3	103
104	J. Potter	13	156	85	Kidd Bros. ...	0	10
			OTHER BREEDS.				
120	T. J. Carr ...	23	178	115	G. and W. Hindes	10	129
118	J. H. Jones ...	24	174	117	J. H. Jones ...	0	120
116	G. and W. Hindes	12	162	113	Parisian Poultry Farm	10	120
119	T. J. Carr ...	23	159				
114	Parisian Poultry Farm	18	144				

CALIFORNIAN METHODS OF POULTRY RAISING AND MARKETING—II.*

In view of the widespread revival of interest in the poultry industry the subjoined article, the first instalment of which appeared in the January Journal, reprinted from the Journal of the Ministry of Agriculture, United Kingdom, and compiled from a Consular Report, will be regarded as of exceptional relevancy.—Ed.

Co-operative Marketing.

The Poultry Producers of Central California Incorporated, is an organisation typical of many in California designed to assist the farmer in marketing his produce in the most effective and economical way, and at the same time to obtain for him the best and most stable price possible.

It is proposed first to outline the methods employed at the Petaluma egg-depôt itself, and afterwards to indicate the co-operative principles upon which the organisation is built.

The depôt consists of a large rectangular building of one story, situated near the railway station, and having sidings and loading platforms along both sides, a third platform being provided at one end of the building for the convenience of automobiles.

Methods Employed.

Eggs are delivered in boxes of thirty dozen each from the railway truck, or, if the farmer lives in the vicinity, from his motor car. The quantities marked on the card attached to the box by the farmer are compared with those entered on a

*From a report drawn up by H.M. Acting Vice-Consul at San Francisco and communicated through the Department of Overseas Trade, U.K.

card inside the box, which is then re-nailed lightly. The boxes are stacked upon a small platform very much like a sled and sent to the re-sorting men upon an ingenious four-wheeled trolley. This is run underneath the loaded sled and jacked up by a single movement so that the sled runners are clear of the ground. Piles of boxes are kept upon the sleds so that they can be conveniently moved at any time with very little labour, and with practically no risk of breaking the eggs. The boxes have already been marked by the farmer according to the grade of eggs which they contain. If a box contains eggs of more than one grade they are re-sorted and made up into full boxes by the re-sorters.

The complete boxes are then inspected to ensure that their contents reach the standard required for the grade. The eggs, which are packed in cardboard frames of three dozen each, are transferred in one movement to somewhat similar metal frames running on a grooved table. They are swiftly looked over by experts who pick out any which are over or under size, dirty or of a bad colour. The frames are pushed along the table by the inspectors and the eggs are re-packed in boxes as they reach the end, the wire frames being shut up and returned along an overhead rack.

The repacked boxes are nailed up on the spot and removed on the sleds above described for shipment.

A Simple and Effective Grading Process.

The extreme simplicity and effectiveness of this grading process is due almost entirely to the education of the individual farmer in the methods of the institution. The great majority of the members can be trusted to grade their own eggs with considerable accuracy, and the inspection is actually only necessary to ensure a standard common to all the consignments and to detect occasional errors.

For the same reason, candling is very little done, except in the case of new members or for other special reasons. All the farmers whose eggs pass through the depôt are themselves members, and realise that care on their own part is necessary in order to dispense with more elaborate arrangements, the expense of which would devolve, ultimately, upon themselves.

The above process is extended in the case of dirty eggs and of eggs for preserving. The dirty eggs are placed upon an endless band of rubber-covered rollers which is passed beneath a funnel emitting a sand blast. As the rollers cause the eggs to revolve they are thoroughly cleaned without the deleterious effect caused by water.

The eggs for preserving are placed upon wire frames similar to those used by the inspectors and immersed for a second or two in oil which is kept at a temperature of 250 degrees Fahrenheit. This has the effect of driving out the air and of sealing the egg, thus rendering it capable of preservation for some months. It may be noted in passing that members are expected to send only sterile eggs to the depôt.

After the completion of the various processes, the boxes are stacked according to the grade of eggs which they contain and loaded on to barges for shipment to San Francisco, or on to railway wagons if for shipment by land.

Individual Care a First Constituent of Co-operation.

It will be noted from the above that the association does little beside co-ordinating the efforts of individual farmers. It in no way relieves them of the responsibility of delivering their eggs in the best possible state for marketing. If the grading and packing work at the depôt runs smoothly, it is because the farmers themselves have taken great pains that it should do so, by performing their own task as efficiently as possible. This is a point of some importance, as indicating the value of individual care as a first constituent of co-operation.

It might be thought that, since only some 65 or 75 per cent. of farmers in the district are members of the Co-operative Marketing Association, its usefulness was problematical. Actually, the proximity of Petaluma to the markets of San Francisco and the Bay Cities adjacent thereto makes it a simple matter for many farmers to make contracts for the sale of their eggs without having recourse to the association: it is when the industry outruns its local market that such a society becomes necessary. In short, though a prosperous co-operative society may be regarded as a criterion of the success of an industry, it is a result of success rather than its cause.

Constitution of Societies.

The question of the constitution of co-operative societies has received much attention in California. Such societies are to be regarded as accessory to the individual in his business, and not as profit-making concerns. They are to provide assistance to

the farmer in proportion to the size of his business through them, and to ensure that none but he and his associates have the controlling interest. The constitution of the Poultry Producers of Central California Incorporated, follows the main principles which have now been accepted in this country as essential for *bonâ fide* co-operative concerns. The initial capital is supplied by local poultry farmers, and subsequent issues are governed by the size of the applicant's poultry ranch—*i.e.*, he can only be allotted one 10.00-dollar share for every 1,000 hens or majority fraction thereof owned by him. Since he must, upon joining, sign an agreement to sell and deliver to the society all the eggs and poultry which he markets, it will be seen that the stock is fairly equitably divided.

The society is governed by a board of eleven directors, all of whom must themselves be poultry producers. An exception is made in the case of one of the directors, who is nominated by the State Market Director of California. There is an Executive Committee of five directors, and a salaried general manager. In addition to the usual annual accounts, the society issues a monthly auditor's financial statement showing the assets and liabilities, and the volume of business and operating costs during the month in question.

Methods of Selling.

The society sells the eggs at the best price it can get, and hands over the proceeds at the average price for the week to the producer, less the cost of the egg-boxes and certain other expenses. These include transportation, and a charge not exceeding 1 cent per dozen eggs for operating and selling expenses. At the end of the fiscal year a reasonable amount is put aside for reserves, dividend, advertising, &c., and the balance of the surplus, if any, is divided among the members according to their deliveries.

In addition to this, 1 cent per dozen is deducted from the selling price of the eggs handed to the producer, and placed to his credit towards the purchase of further shares. As soon as 10.00 dollars is made up in this manner the producer is given a further share in the society. This procedure will, however, cease as soon as the authorised capital has been paid up.

In times of plenty, the society, at its discretion, places a proportion of the eggs delivered in store, paying the producers at the end of the week at the current market price. When it is considered wise to sell these, the producers generally are credited with the further profit made, or debited with the loss incurred should storage and insurance absorb the profit. This second transaction is, of course, between the society and those producers only who made deliveries during the week in which the eggs were put in store.

The society has the right to send eggs to any market which it may consider advisable, and in that case is considered to have bought the eggs at the current market value at the time of shipment. The profit or loss on these transactions is, however, credited or debited to the general corporate fund, and not directly to the producers.

This Central Californian Society has not considered it yet necessary to apply co-operative methods to the marketing of poultry, but should it decide to do so, the members, after ten days' notice, are bound to begin delivering their poultry for marketing to the society as they now do their eggs.

These are only main points in an organisation typical of many which exist for the marketing of various agricultural products in California.

Business Principles Necessary.

It is thought that American methods could profitably be studied by poultry farmers in the United Kingdom. This is not to say that imitation of particular methods is all that is desirable, or that such imitation would, in fact, revolutionise the British poultry industry. The main point is the necessity of business principles in the building up of a prosperous industry. These have been applied with such conspicuous success in the United States, and notably in the district referred to above, that persons interested in the industry would be well advised to make a close study of these principles and the methods to which they have given rise. In particular, the spirit of co-operation and a certain financial courage, when allied with individual hard work and enterprise, would appear to be the main desiderata for success. When it is realised that so compact and successful a community as that of Petaluma has grown up in a State the size of England, but with only one-tenth the number of inhabitants, the possibilities of the poultry farming industry in the United Kingdom, where so tremendous and convenient a market exists, would seem to deserve exploitation to the fullest possible extent.

"THE PURE SEEDS ACT OF 1913," AS AMENDED BY "THE PURE SEEDS ACT AMENDMENT ACT OF 1914."

By F. F. COLEMAN, Officer in Charge, Seeds, Fertilisers, and Stock Foods Investigation Branch, Department of Agriculture and Stock.

The abovementioned Acts are intended to regulate the sale of seeds for planting or sowing—that is to say, all vendors of seeds must comply with the Acts and Regulations thereunder.

Samples for Examination.

In order to ascertain if seeds comply with the Acts, samples may be submitted to the Department of Agriculture, Brisbane, for analysis. It is of the utmost importance that the samples be drawn by the sender from the seed in his actual possession, care being taken to obtain a small quantity from each bag, carefully mixing them together in order to make the sample truly representative of the bulk.

Weight of Samples.

All samples of seed sent for analysis must not be less than the weights herein set out, and in the case of seeds containing foreign ingredients double the weight mentioned should be sent.

Wheat, Oats, Barley, Maize, Rice, Rye, Cowpeas, Tares, Peas, Beans	8 oz.
Lucerne, Clover, Sorghum, Sorghum Sudanense (Sudan grass), Setaria (Foxtail millet), Japanese millet, White panicum, French millet, Linseed, Canary, Prairie grass, Buckwheat, Cotton	4 oz.
Rhodes grass, Paspalum dilatatum, Rye grass, Cocksfoot, Couch grass	2 oz.
All agricultural seeds other than those included above ..	2 oz.

Marking of Samples.

Before sending any samples care should be taken to see that the following particulars are plainly written thereon in ink:—

(1) Kind of seed.
(2) Quantity the sample represents.
(3) Marks on bags or grower's name.
(4) Name and address of sender.

Unless these particulars are plainly written on the sample delay will ensue.

When the information is required for commercial purposes a fee of 2s. 6d. per sample is charged, which fee should be enclosed with the covering letter advising of the despatch of the sample. All samples, with covering letter, should be addressed to the Under Secretary, Department of Agriculture and Stock, Brisbane.

The official reply is sent in the form of a report or certificate, which gives the percentages of purity and germination, also the percentage of the various foreign ingredients that the sample contains.

"Purity" means the percentage by weight of pure seed that the sample contains, and the term "Pure seeds" means the seeds of which the sample purports to consist after the impurities or foreign ingredients, as defined below, have been eliminated; but, in the case of those species, kinds, or strains of plants, the seeds of which cannot be distinguished from one another by expert examination, the use of the term "Purity" does not imply that the seed is genuine or true to name.

"Germination" means the percentage, calculated by number, of pure seeds as defined above which germinate during a germination test.

"Foreign ingredients" or impurities include inert matter, seeds of weeds, or seeds of any plant other than the seed in question, or dead, diseased, insect infested, non-germinable, or hard seeds.

"Inert matter" includes broken seeds less in size than one-half of a complete seed, or chaff, dust, stones, or any material other than seeds.

"Hard seeds" mean any seeds whose seed coats are so impervious to water as to delay germination.

FORM OF CERTIFICATE.

A certificate of analysis gives the following particulars:—

Calculated by Weight.	Calculated by Number.
Purity (or Pure Seeds) ..... per cent.	Germination ..... per cent.
FOREIGN INGREDIENTS.	
Inert matter .....per cent.	Hard Seeds ..... per cent
Seeds of weeds or seeds of any kind,* other than that to which the sample purports to belong .....per cent.	Dead and non-germinable seeds .....per cent.

* The principal seeds are (names of weed seeds, &c.).....

Unless the sender is careful to forward a truly representative sample the certificate is valueless. Under no circumstances is it a guarantee by the Department of Agriculture as to the bulk, but an analysis of the sample received, giving a plain statement of its condition at the time when such analysis was made.

Invoice must be given by Vendor.

On the sale of any seeds of not less value than one shilling the vendor must give to the purchaser an invoice stating that the seeds are for planting or sowing, the kind or kinds of such seeds, and that they contain no greater amount of foreign ingredients than is prescribed.

The actual wording on an invoice should be—

> "The seeds mentioned on this invoice are for planting or sowing, and contain no greater proportion or amount of foreign ingredients than is prescribed for such seeds."

Definitions of "Vendor" and "As grown."

A vendor is any person who sells, or offers or exposes for sale, or contracts or agrees to sell, or deliver any seeds. In other words, an Auctioneer, Storekeeper, Produce Merchant, Seedsman, Grower of the seed, or any other persons, are vendors whenever they sell or offer for sale any seeds as seeds for sowing. Section 6 of the Regulations provides for the sale of "As grown" seeds to seed merchants to be cleaned and graded by the merchant before being offered for sale as seed for sowing. The sale by farmers of "As grown" seeds is therefore limited to such merchants as are in possession of one or more efficient seed-cleaning machines. A farmer is a vendor under the Acts whenever he sells to another farmer or to any other person, and must give an invoice, as required by the Acts. The only exception is the sale of "As grown" seeds to merchants for cleaning and grading.

Prescribed Standards and "B" Grade Seeds.

The percentage of weed seeds, inert matter, dead and non-germinable seeds, and other foreign ingredients that may be contained in the different kinds of seeds are prescribed by the Regulations, copies of which may be obtained from the Department of Agriculture.

"B" grade seeds are seeds in which the amount of foreign ingredients exceeds the proportion set forth in Schedule A of the Regulations, but does not exceed the proportion set forth in Schedule B, such seeds may be sold as seeds for sowing, providing they are contained in bags or packages to each of which is affixed a label, brand, or stamp, clearly and indelibly marked, specifying: The kind or kinds of such seeds; that the seeds are "B" grade, for planting or sowing, and contain no greater proportion or amount of foreign ingredients than is prescribed; also the name and address of vendor. All invoices relating to such seeds must be distinctly marked "B" Grade Seeds.

Every purchaser should know the purity and germination of the seed that he intends to buy or sow; also its freedom from diseased or insect-infested seeds. These matters can only be decided by a thorough examination of a large and truly representative sample drawn from the actual bulk in the sender's possession. Seeds constitute the most variable material that the farmer or merchant purchases, and the success or failure of a crop, or even succeeding crops, may be wholly determined by the kind or condition of the seed sown. No one can afford to leave any doubtful point to chance, and it is but common prudence to ascertain the purity and germination of all seeds purchased before sowing or offering them for re-sale.

Free Analysis for Farmers—Better Seeds mean Better Crops.

In buying let quality be your guide; the best is never too good. No charge is made to farmers sending in samples of the seeds that they have purchased for their own sowing, providing the following particulars are plainly written on each sample:—

(1) Vendor's name and address.
(2) Name of seed.
(3) Quantity purchased.
(4) Date of delivery.
(5) Locality where seed is to be sown.
(6) Name and address of purchaser.

Although buyers and sellers are able to form a good idea of the market value or price, experience shows that they are frequently misled as regards purity and germination. It is impossible to determine the amount of weed seeds, non-germinable seeds, hard seeds, or inert matter other than by a purity analysis and germination test conducted under uniform scientific methods. Any opinion as to the quality or condition of any agricultural seeds is useless unless based on the examination of a truly representative sample. This work is undertaken by the Seed Laboratory of the Department of Agriculture.

Before sending any samples, care should be taken to see that the required particulars are plainly written thereon in ink.

Covering Letter.—All samples, with covering letter, should be addressed to—

The Under Secretary,
Department of Agriculture and Stock,
Brisbane.

SUGAR: FIELD REPORTS.

The Southern Field Assistant, Mr. J. C. Murray, reports under date 3rd January, 1923, as follows:—

Maryborough.

Cane is looking well in this district and acreages are gradually being extended. There is still a fair amount of land outside Maryborough that could and probably will be planted provided the price of sugar is sufficiently encouraging. This applies in a large degree to that tract of forest country that is lying between the city and Tiaro, where, excepting for frosted places, quite a lot of cane could be grown.

The varieties mentioned in the previous reports as making favourable progress are still doing well, while ratoons cane are making a good showing. It is probable here, as well as in other districts, that the farmers would get better tonnages from ratoons if they studied ratoon fertilising in suitable weather. Very often a ratoon crop which turns out a partial failure would have been a success had, say, judicious application of mixed fertilisers been used. Farmers are recommended to increase the humus content of the soil by green manuring. They are also recommended to remove useless and discarded varieties from their farms, as these only act as hosts for insect parasites and injurious bacterial agencies.

Pialba.

Farmers have had good rains, and the young crops, plant and ratoon, look forward and healthy. Canegrowers are paying more attention to scientific methods of production, and the result of this is observed on some of the plant cane and the appearance of the soil, which has been rendered friable by intensive cultivation and the use of lime. Great credit is also due to these farmers who have variety plots, for the care and discrimination with which they are looking after them. Cane varieties at present looking promising are Q. 813, E.K. 1, E.K. 28, Shahjahanpur No. 10, M. 1900 Seedling, and Demarara 1135. J. 247 is also making a good showing.

Liming has been conclusively proved successful on a typical Pialba soil, and one progressive farmer has had good results from the use of 2 cwt. meatworks, 2½ cwt. sulphate of ammonia, 2½ cwt. sulphate of potash, and 3 cwt. superphosphate. This mixture was applied with positive results. The soil, however, was a little better than a typical Pialba soil, that is to say, the texture was probably better. Guano has also been used on the same soil but with no positive results, until the ratoon crop, and then it was noticeable where the ½ ton per acre of guano had been placed.

Mount Bauple.

There is every prospect of a good season at Bauple next year. Splendid rains have fallen, in some instances a little too heavy, causing washaways in places, but, on the whole, the district has benefited greatly. The young plant cane and ratoon are very healthy and forward, showing no disease or evidence of parasitic attack. The farmers are busy keeping down weed growth and cultivating, the latter being very necessary to ensure against evaporation and caking of soil after the heavy rain. Farmers here are recommended to eliminate discarded varieties as much as possible, and only grow canes likely to develop into economic growth. There is little to comment upon since last visiting Mt. Bauple. The Shahjahanpur No. 10 is making a good showing and should do well in the district. Other canes making good progress include E.K. 1 (this variety looks particularly well), E.K. 2, E.K. 28, H. 109, Q. 970, M. 1900, and Q. 813. Reintroduced D. 1135 and M. 189 are canes that are making a very good showing also.

The Northern Field Assistant, Mr. E. H. Osborn, reports under date, 4th January, 1923:—

Proserpine.

At the time of my visit this area was suffering severely from the effects of dry weather, and consequently 1923 prospects were not too encouraging.

Very little of the November rain that fell at the Burdekin reached the Proserpine area, with the exception of Kelsey Creek and Banana Pocket. These districts had probably 1½ to 2 inches, against about half an inch in the other parts. Up to the end of November 37.39 inches of rain only had been recorded at the mill, which is a very big decrease below the general average rainfall.

34,167 tons of cane had been crushed for an average of 14.95 c.c.s. Some 4,610 samples were taken on an average of one for every 7.4 tons of cane. Below is a list giving particulars of the cane put through the rollers:—

Variety.	Average c.c.s.	Per cent. of crop.
H.Q. 426	15.6	26
Q. 813	15.5	9
B. 147, B. 208, Q. 1121, Q. 114, and Q. 116	15.5	3
Badila	15.4	10
M. 1900	15.2	5
Mixed varieties	14.4	12
Goru	14.2	13
S. Singapore	14.2	6
D. 1135	14.2	6
Malagache	14.1	10
		100 per cent.

It will be noticed that again this year H.Q. 426 is easily the favourite, but is run a good second by Q. 813, whilst the 3 per cent. of B. 147, B. 208, Q. 1121, Q. 114, and Q. 116 are also very high in sugar content.

When the very dry nature of the season is taken into consideration, it is really wonderful to see how well some blocks of plant cane are looking. Most of them, however, are either on or adjacent to the water frontages.

Among those most noticed was a 30-acre block of July plant growing upon Mr. R. Ruge's farm upon the river bank. At Kelsey Creek, Mr. J. C. Edwards has some very fine plant cane, consisting of Badila, M. 190, and D. 1135. His ratoons also show very good growth. This grower has ploughed deeply and often, has scarified continually, and has generally kept his cane in good order.

Probably more cultivation has been put into the Proserpine cane area this year than in any former one, and it is due to such continual work that the cane still holds out so well under such adverse weather conditions.

At Banana Pocket the conditions were very dry, although better than in Proserpine proper. Since my last visit several new farms have been opened up, and there are now twelve or fourteen growers in residence.

Among the cane growing there, Mr. R. Thomas's July plant stood out on its own, being ahead of any cane seen elsewhere in the Proserpine area. It consisted of H.Q. 426, Badila, N.G. 24 and 24 B., M. 1900, and D. 1135, and certainly looked very well indeed. Mr. Thomas said that his average density for twenty-months old plant cane of the above six varieties was 14.6 c.c.s It is to be hoped that all the available land in this area will soon be under crop, as the Proserpine mill is in need of such cane.

Lower Burdekin (Kalamia, Pioneer, and Inkerman Areas).

Kalamia finished crushing on the 16th December for 70,000 odd tons of cane, and although generally speaking the average density figures were below those of last year, yet in places some high figures were reached. One grower, I am told, had an average of 19.1 c.c.s. for a couple of weeks from B. 208.

Generally, the cane looks well despite the dry weather, and some really nice plots of cane were noticed. Among them was a block of 30 acres plant belonging to Mr. H. Parker (August) of H.Q. 426 and 24 B. This was watered at time of planting and afterwards manured with 4 cwt. of mixed manure to the acre. Nearby a small block of first ratoons (H.Q. 426) had been given the same treatment and was cutting at the rate of 20 tons to the acre. Some extremely nice cane was also noticed upon Messrs. Butterworth's, Wellington's, and Raff's farms.

The lastnamed grower has just added to his steam pumping plant an electric 8-inch pump, worked from the Ayr power-house. Mr. Raff speaks well of this installation.

Pioneer Mill.

This mill put through a total of 93,300 tons of cane for the season, but for a lower density than last year. For next year there is some 3,000 odd acres planted, of which about 60 per cent. has been planted early. This has all struck very well, as has also about half of the late plant. Some of the crops look very well, mainly B. 208, Badila, H.Q. 426 (Clark's Seedling), and the Gorus N.G. 24, 24A, and 24B. These varieties certainly grow to great advantage upon the Burdekin soil.

Mr. H. H. Kastener, of Klondike, kindly supplied the following interesting particulars of some cane varieties harvested by him:—

Variety.	c.c.s.	Value.	
		s.	d.
Q. 908	14.0 ..	51	6
Q. 855	13.1 ..	47	2¾
Q. 970	12.7 ..	45	4
Hy. No. 1 ..	15.5 ..	58	7½
*Q. 813	14.7 ..	54	9¾
„	15.1 ..	56	8¾
„	14.1 ..	51	11¾
„	15.0 ..	56	3
„	16.0 ..	61	0
„	15.0 ..	56	8¾

Planted in August, cut early next August.

Planted in September, but cut in August (early).

Home Hill (Inkerman Mill).

The progress of this district during the past twelve months has been remarkable. New and substantial houses are being built in every direction, and the farmers generally are optimistic as regards the future success of their canegrowing operations; that is, of course, if the price of sugar keeps up to a reasonable figure. A large number of the farms are now being supplied with irrigation water, and a number of these interviewed seemed well satisfied.

Another noticeable feature was the very large number of tractors that have come into use since my last visit only six months ago. They are of all types, and are getting over a great deal of ground.

During the crushing just finished at Inkerman mill, some 119,000 tons were put through. Like the other Burdekin mills, however, the density was on the low side. This was caused by the dry weather early in the year. The State Farm records show that for July, August, September, and October only 2.28 inches fell, and of this amount 1.7 inches fell in July. Naturally, with such dry weather conditions, the cane crushed early in the season was badly dried. Going through the areas it was also noted that more attention is being paid to green manuring, liming, and using artificial manures, and most of the growers recognise their value. For instance, Mr. S. W. Gibson cut a 10-acre block of first ratoons, Badila, and N.G. 24B, for a return of 31 tons to the acre. This had been manured with about 6 cwt. mixed manure to the acre. As a plant crop he received a yield of over 40 tons per acre. Last year a first ratoon crop manured with the same quantity of manure gave him a 26-ton yield per acre.

Mr. Gibson uses 2 tons of earth lime per acre and also ploughs in Mauritius bean.

Pests in the Burdekin Areas.

At time of writing the grey-back cane-beetle is very numerous on and about Plantation Creek (in the vicinity of Norham). The Burdekin Canegrowers' Association are fully alive to the danger and are now very busy collecting beetles.

Some big cheques are being made by the various collectors—Mr. Hobson having paid one man £9 for three days' work, paying for the beetles at the rate of 1s. 6d. per quart. Another grower collecting has paid for 1,647 quarts between 1st and 26th of December. The association is to be complimented on the energetic way in which it is trying to minimise the effects of this pest.

In connection with cultivation matters generally, it is pleasing to see how this district is going ahead. Manuring is now being carried out to a very large extent. Quite a large number of growers are also using green manures, and liming is becoming far more popular. Roughly speaking, there are about thirty-six tractors on the Ayr side of the river. Two or three automatic light ploughs are already in use and three more are on order.

As a result of the recent beneficial rains the whole district presents a beautiful appearance, and at present everything points to a splendid season for 1923.

* The Q. 813 was cut from an 8-acre block of medium shallow forest country, and was only ploughed twice, cutting at the rate of 17 tons to the acre. Its c.c.s, however, averaged nearly 16, or very much more than the average c.c.s of the mill for the season.

THE USE OF FERTILISERS IN SUGAR-CANE CULTIVATION.

BY H. T. EASTERBY, Director of Sugar Experiment Stations.

The past three years has seen a great increase in the use of manures for sugar-cane, but there are still many farmers who continually deplete their soils without in any way attempting to restore necessary plant foods. Moreover, the higher costs of production, combined with the possibility that we shall see a reduction in the price of sugar, makes it imperative that every farmer shall make it his business to get as much as possible out of his land by more intensive cultivation, proper soil handling, and by the aid of fertilisers where the use of them is indicated. The Sugar Experiment Station has for many years past freely encouraged cane farmers to send in samples of their soils for analyses, and obtain advice thereon, and up to the present upwards of 1,000 sugar soils have been so analysed. Many lectures on manuring have also been delivered by the Sugar Bureau, and particulars have been published in pamphlet form. With the results of soil analyses, letters of instructions as to the treatment of the land is forwarded.

It will be useful before proceeding to deal with fertilising substances to consider how much plant food is removed from the soil by cane crops. This appears to vary a good deal according to the variety grown—for instance, in some experiments carried out in 1915 and analysed, it was found that the three varieties of cane known as H.Q. 426 (or Clark's Seedling), Badila, and Goru, removed in pounds per acre the following amounts of plant foods:—

Name of Cane.	Potash removed. Pounds per Acre.	Phosphoric Acid removed. Pounds per Acre.	Nitrogen removed. Pounds per Acre.
H.Q. 426 ..	137	77	105
Badila.. ..	166	59	109
Goru	91	23	60

It will thus be seen that the constant growing of cane crops on lands where no attempt is made to replace plant foods means the removal of huge stores of mineral matter essential to crops, and the ultimate poverty of the lands. Farming under these conditions has often been compared to a spendthrift squandering his principal.

The Application of Manures.

The manurial elements needed in the growing of successful cane crops are nitrogen potash, and phosphoric acid. These are usually supplied in the following fertilisers:—

Nitrogen in—

- Nitrate of soda—contains about 15 per cent. nitrogen.
- Sulphate of ammonia—contains about 20 per cent. nitrogen.
- Nitrate of lime—contains about 12½ per cent. nitrogen.
- Nitrolim—contains about 18 per cent. nitrogen.
- Dried blood—contains about 11 per cent. nitrogen.
- Meatworks manure—contains about 3 to 4 per cent. nitrogen.

Potash in—

- Sulphate of potash—contains about 52 per cent. potash.

Phosphoric acid in—

- Superphosphate—contains about 16 per cent. phosphoric acid.
- Rock phosphate—contains about 18 per cent. phosphoric acid.
- Guano—contains about 15 per cent. phosphoric acid.
- Thomas phosphate—contains about 17 per cent. phosphoric acid.
- Meatworks manure—contains about 17 per cent. phosphoric acid.
- Bone dust—contains about 20 per cent. phosphoric acid.
- Basic superphosphate—contains about 19 per cent. phosphoric acid.

Phosphoric acid is found in a readily soluble form in superphosphate, it being practically all water soluble in that material. In the other forms shown above, the phosphoric acid may be partly citrate soluble and partly citrate insoluble.

Hints on Purchasing and Using Manures.

1. Do not take delivery of manures unless they are accompanied by an invoice certificate containing the guaranteed percentage of the article purchased, or, in the case of a mixture, the guaranteed percentages of the different ingredients.
2. Do not accept delivery of bags of fertiliser that are not labelled or branded.
3. It is much wiser not to buy fertiliser of low grade, as you may have to pay freight on a lot of useless material.
4. Always see you obtain the manure you order.
5. Do not give a higher price per ton than the registered price under the Fertilisers Act. This may be seen periodically in the "Agricultural Journal."
6. Do not buy more manure than you intend using, as fertilisers do not improve with keeping.
7. If possible, mix your own fertilisers, as you can vary the proportions to suit your own requirements.
8. Always remember you want to manure the crop, not the land.
9. Prevent bags of fertiliser from getting wet. This always leads to loss, and frequently sets the manure in hard lumps, difficult to break up.
10. Finally, always bear in mind that fertilisers give the best results on well-tilled soils and that they also need moisture in the soil. Applying fertilisers in time of drought is waste of manure.

Under the Fertilisers Act it is required that the dealer shall, at the time of sale or before delivery, give to the buyer an invoice certificate, signed by the seller or his agent, stating the full name and place of business of the dealer; the name, trade mark, brand, or sign used to mark packages containing such fertiliser, and used to identify such fertiliser; the quantity or net weight of fertiliser comprised in the sale; the composition of the fertiliser, setting forth the proportion per centum in which such fertiliser contains the following ingredients:—Nitrogen, phosphoric acid, potash, and lime, and the respective forms in which they respectively occur; and, in the case of bone dust, basic slag, agricultural lime, &c., the percentage of coarse and fine material.

Furthermore, every dealer who sells fertiliser, which term includes offering or exposing for sale and having in possession for sale, shall securely affix to each package a printed label, clearly and truly certifying: The number of net pounds of fertiliser in the package; the figure, trade mark, or sign under which the fertiliser is sold; the chemical composition of the fertiliser, in the same manner as stated on invoice certificate; and the state of fineness for certain fertilisers.

In mixing fertilisers care must be taken not to bring ingredients together which would lead to decomposition or loss of some part of the manure. Thus, should lime be mixed with sulphate of ammonia or superphosphate, loss would result, as it would also if Thomas phosphate were mixed with sulphate of ammonia.

Nitrate of soda is easily leached from the soil, hence it should not be applied during a heavy wet season. It is a great stimulant, and has frequently been found to add such strength and vigour to cane plants that it strongly aids in obtaining other mineral food, such as potash and phosphoric acid, from the natural resources in the soil. Nitrate of soda will often show its effects in a week or two, producing a rich, dark-green colour in the foliage, and cause a marked improvement in the growth of the cane.

Nitrogen, in the form of sulphate of ammonia, is not so quick in action as in nitrate of soda; while nitrogen in dried blood, bone dust, and meatworks is still slower in action, as they require chemical changes to convert them into nitrate so as to become available to the plant.

Meatworks, in the wetter cane areas of North Queensland, is often preferred to superphosphate as being less soluble.

As a rule, considerably more benefit is got from the manuring of ratoons than from the manuring of plant cane, and this experience is common. This is strikingly shown in the following summary of experiments carried out at Mackay:—

PLANT CROP. Tons of Cane per Acre.			FIRST RATOON CROP. Tons of Cane per Acre.			SECOND RATOON CROP. Tons of Cane per Acre.			THIRD RATOON CROP. Tons of Cane per Acre.		
Manures..	No Manures.	Difference.	Manures.	No Manures.	Difference.	Manures.	No Manures.	Difference.	Manures.	No Manures.	Difference.
50·7	47·4	3·3	42·4	31·7	10·7	38·8	24·1	14·7	35·9	19·8	16·1

The manures applied to the above were nitrate of soda, sulphate of ammonia, superphosphate and sulphate of potash.

It is not recommended that mixed fertilisers should be placed in the drill with the cane plants. As soon as the cane is about 18 inches high, drills 4 to 5 inches deep should be drawn about 10 inches from the cane plants on each side of the row, and the fertiliser advised is put into these drills and then covered, or a manure distributor can be used. Both sides of the row, however, should be treated. If nitrogenous fertilisers alone are recommended, such as nitrate of soda and sulphate of ammonia, they can be applied on the surface of the soil near the cane. Organic forms of nitrogen, such as meatworks and blood manures, requiring the action of soil organisms to render them available, should be placed in drills and covered.

For ratoons the manures can be applied while working the interspaces. They may be dropped in the furrow, ploughed away from the cane, and then covered.

For the continued successful use of artificial fertilisers, the land should not be acid in reaction. Considerable risk is involved in the contiuued use of manures such as sulphate of ammonia, sulphate of potash, and acid phosphates unless lime dressings have been previously made.

On given soils, particularly some of the red volcanic type, better results from the use of organic fertilisers, such as bone meal, blood manure, meatworks manure, &c., have been realised. Megasse ash, molasses ash, and filter press cake should all be availed of when they can be procured. The latter should be ploughed in some three or four months before the cane is planted, and the same may be said regarding the application of molasses.

Before applying fertilisers it would be wise to send samples of the soil of the farmer (not less than 5 lb.. in weight) to the Bureau of Sugar Experiment Stations, Brisbane, for free analyses and advice, accompanied by a form giving full particulars. These forms may be obtained from the office of the Bureau, in Brisbane, but many secretaries of the different Farmers' Associations have supplies.

Advice on the kinds of fertilisers to use, prices, &c., may always be obtained from the Sugar Bureau.

The very best of cultivation must always be used to obtain the best results from fertilisers. A moderate to good rainfall is also essential, as without plenty of moisture, manures lie dormant in the soil and are, indeed, often lost altogether in loose and porous soils.

Plate 29.—Sugar Cane.

THE SUGAR INDUSTRY.

Stabilisation Proposals.

Conference Favours Pool.

In response to an invitation from the Government, representatives of the Queensland Sugar Industry met in conference with the Premier (Hon. E. G. Theodore) and Minister for Agriculture and Stock (Hon. W. N. Gillies) on the 23rd and 24th January. The Conference decided in favour of a Pool to control all sugar produced in this State during the next five years; the prohibition by the Commonwealth Government of the importation of black-grown sugar, except so much as might be required to make good any Australian shortage; and the retailing of sugar at a price not exceeding 4¾d. per lb. in the larger cities, an agreement to be made between the Pool and the refiners for the refining and distribution of the sugar. It was also decided to place the Conference resolutions before the Federal authorities by delegation. Subjoined is an abridged report of the proceedings.

An important conference to consider the welfare and permanency of the sugar industry of Queensland was opened in the Office of the Minister for Agriculture and Stock (Hon. W. N. Gillies) on the 23rd January, and continued next day.

Mr. Gillies presided. The invited delegates were:—

Standing Sugar Committee of the Council of Agriculture: Messrs. W. J. Short, T. A. Powell, W. G. Batchler, G. H. Pritchard, and C. V. Hives; Australian Sugar Producers' Association: Messrs. A. Adie, F. C. P. Curlewis, Senator T. W. Crawford; United Cane Growers' Association: Messrs. G. Johnson, J. J. Castor, W. H. Doherty; Millers' Representative on Cane Prices Board and Representative of the C.S.R.: Mr. P. H. M. Goldfinch; Cane Growers' Central Board: Mr. W. H. Marshall; Millaquin Refinery: Mr. W. R. Hartnell. There were also four visitors from New South Wales, who were permitted to remain as spectators. These were Messrs. Nudgley, Robbins, Ellis, and C. Farlow. Mr. F. M. Forde, M.P., Capricornia, was also in attendance.

The Chairman's Address—Sugar and White Australia.

Mr. Gillies welcomed the delegates. He said they all recognised the benefits of the sugar agreements since 1915, particularly the last one, whereby the industry increased in value by £5,000,000, and 40,000 more acres were placed under sugar than before. Farmers were able to give better attention to cultivation, and the standard of living of the growers improved. It was for the delegates to endeavour to formulate a policy that would enable the prosperity of the industry to be continued in the absence of a Commonwealth agreement. It was their most important industry, and with it was involved the White Australia policy. From 1907 to 1920, Australia imported sugar to the value of £21,000,000, and seeing that we had the land, the climate, and the rainfall, we ought to be producing all the sugar that Australia required. Under a proper system of control it could easily be done, and the benefits resulting from the agreements justified some sort of Government control. They had to face the situation and endeavour to put before the producers, the people of the Commonwealth, and the Federal Government a scheme which would be acceptable, and which would give permanency to the industry and encourage the clearing of more land and the planting of more cane.

Speech by Mr. Theodore—Facing Plain Facts.

The Premier (Hon. E. G. Theodore) then launched his proposals. He said he did not want to exploit the occasion for any purpose, but wished to put forward plain facts concerning the industry and the situation they were up against. He hoped they would set aside all considerations of politics and differences between

Left to Right—

T. A. Powell.

J. J. Castor.

G. Johnson.

A. Adie.

W. H. Doherty.

W. M. Marshall.

P. H. M. Goldfinch.

W. J. Short.

Hon. E. G. Theodore.

Hon. W. N. Gillies.

A. R. Henry
(Secretary).

W. H. Franklin
(Stenographer).

C. V. Hives.

W. G. Batchelor.

F. C. P. Curlewis.

W. R. Hartnell.

G. H. Pritchard.

Senator
T. W. Crawford.

Plate 30.—Delegates, Sugar Conference, Department of Agriculture and Stock, Brisbane, 23rd January, 1923, Hon. W. N. Gillies Presiding.

associations, realising they were there for the one purpose of fixing up some kind of arrangement to ensure reasonable conditions for some years. In that respect they were a single purpose league. The industry was faced with a crisis. Growers, millers, and everyone concerned had of late got into the habit of hiding their heads in the sand; they had refused to look facts in the face. It was useless assuming that there would be a continuance of the agreement. They knew it would not be renewed by the Commonwealth Government. He said that advisedly, so that they could know what the industry was faced with. What, then, was the next best scheme for the good of the sugar industry and the protection of those who had capital vested in it? The industry was exposed to competition with the whole world, save for that small protection through the tariff duty of £9 6s. 8d. That duty was not sufficient to enable the industry to be carried on with a reasonable degree of prosperity: it was relatively no better protection than they had before the first agreement, if it were as good. The extra cost of freights, sacks, and insurance absorbed the difference between the £6 before the agreements and the £9 6s. 8d. now offered. It would be adequate protection if the price of Java sugar would keep up to its present figure, but there was no guarantee of it, and under the circumstances £9 6s. 8d. left them in the wilderness. Mr. Knox himself had told him that if the protection was not increased, and there was no agreement, they were back to the 1913 conditions.

A voice: Slavery.

Stabilisation Necessary.

The Premier: In the course of a year or two the industry would become extinct. He went on to say that the average pre-war price of imported sugar for eight years was £11 17s. 6d. per ton. They might expect to have to again face such a price in the future. What they wanted was not merely a high price to-day, but something like assured conditions for the future, so that the workers, farmers, and millers could have confidence. In whatever action was taken, Commonwealth co-operation was essential, because the principal factor in securing stability was the price which the consumer would pay and the measure of protection from outside competition. He thought they should ask the Commonwealth Government to prohibit the importation of black grown sugar under conditions which the Government would naturally want to dictate.

Pool Proposed.

His proposal was that they should form a pool in Queensland to take over the raw sugar as had been done under the agreements, and to make agreements with the refineries for the refining and distribution of the sugar. The pool would also regulate with the refineries the price to be charged to consumers and retailers through the distributing agencies. The pool, too, would have to manage whatever importations were necessary to make good any shortage, and to make proposals for financing carry over or surplus production. If they had a pool for five years it would give stability, and if the Commonwealth would prohibit importations, it seemed to him that the pool could so arrange that the consumer would not be charged more than 4½d. per lb. for refined sugar.

The Price of Raw Sugar.

The Premier went on to say it might be thought that they were being asked to sacrifice too much in fixing the price for raw sugar at £27, as against the present £30 6s. 8d., but they had to look the facts in the face, and it was no use holding out for the impossible. If they said £30 6s. 8d. was the lowest they could possibly accept they might have to face the extinction of the industry. The main desideratum was stability, and if they get £27 for five years, it must be a good thing for the industry, even if it meant some small sacrifice on the part of the growers and millers. They would have to cut down the costs between the refineries and the mills. These costs had been going up under all headings, and the costs of distribution had advanced enormously. The cost of shipping freights would also have to come down. He was not suggesting a wholesale attack on wages, because, looking at the special conditions of seasonal employment and working under tropical conditions, the wages were not exorbitant; but costs could be cut down in the mills, and possibly in the fields, to enable £27 to be an economic price. Fortunately, once the price of sugar was fixed, the basis of allocation between the miller and the grower was determined by agreement between the parties—an agreement which had been recognised by the Central Sugar Cane Prices Board. He thought it possible that the Commonwealth Government might have to legislate to give effect to the embargo on the importation of sugar.

Senator Crawford: It would be done under the Customs Act.

The Premier: That simplifies the situation.

New South Wales Sugar and the Pool.

In answer to Mr. Powell, the Premier thought there would be no difficulty with the New South Wales sugar if they had a Queensland pool. The other States would have to recognise mutual obligations. He then submitted the resolutions as set out at the commencement of the report.

Asked as to the constitution of the suggested pool, the Premier thought one representative each of the growers, millers, and Government would be sufficient.

Discussing the first proposal, Mr. Pritchard said that if they were going to establish a pool he thought that the C.S.R. Co. should be asked to include in that pool the whole of the product of New South Wales.

Mr. Goldfinch said that he could not commit the company to anything. He did not understand where the pool started and where it finished. The C.S.R. Company was out to help the industry and place its plant at the disposal of the community with certain safeguards and with a moderate return for its investments. In the meantime he would like more details as to where the pool came in and what responsibilities it had.

Establishing the Pool.

Mr. Theodore said that with reference to the representation of refiners, it had been definitely intimated to Mr. Gillies that the C.S.R. representative would not be able to commit himself. The growers and millers were primarily concerned at the conference, and they should be able to arrive at a definite policy and carry it out. If they started to refer the resolutions to the canegrowers' association, &c., it would be Christmas before they arrived at any decision. He could understand the refiners' qualification, because they came into the negotiations subsequently. With regard to the legal entity of the pool, it was simple to lay down the pooling system. In the past the Commonwealth Government had taken control, because in the first instance this State got the ownership by the Sugar Acquisition Act, and passed it over to the Commonwealth. In the same way the Queensland Government could issue a proclamation, acquire the sugar and pass it on to the pool. At no stage could the Government be disconnected from the pool because of the finance, which had to come from somewhere. That being the case, the Government would be directly associated with the pool when it was formed. There would be no doubt, the Premier concluded, that when they decided on it and the pool was launched it would have the ownership of the sugar and the authority to negotiate with the refiners and carry the whole transaction through.

Effort to Renew Agreement.

Mr. Powell said he did not believe that all the means of renewing the agreement had been exhausted. He said that he thought before adopting the pool system it was their duty to go again to the Commonwealth Government and ask for a renewal.

The Premier: If I thought there was the remotest possibility of getting a renewal, I would go bald-headed for it.

Mr. Powell said he believed the Premier was honestly trying to do something from his point of view. The producers, he said, under existing conditions, could take no less than what they were receiving at present. He then moved the following motion on the understanding that the formation of a pool was to be an alternative:—"That in view of the fact that the effect of the current sugar agreement has been to substantially assist to stabilise the industry, and having regard also to the very great importance which the industry is economically, industrially, and nationally to the Commonwealth as a whole and to the State of Queensland and New South Wales in particular, this conference strongly urges upon the Commonwealth and State Governments the urgent necessity of renewing the agreement, at the same price, for a period of five years."

The motion was carried unanimously, and all subsequent resolutions were agreed to failing the renewal of the agreement.

Pool Favoured.

The Premier's proposal for the formation of the sugar pool was then placed before the conference, and it was adopted unanimously.

Mr. Pritchard then moved—

"That the Queensland Government be asked to acquire the whole of the Queensland output under the provisions of the Sugar Acquisition Act, and that the Colonial

Sugar Refining Company be asked to include in the pool the whole of the New South Wales output from their three mills.''

This motion was agreed to unanimously.

Mr. Goldfinch (C.S.R. Representative): I do not think there will be any difficulty, because the company would be quite prepared to bring all New South Wales in.

Black Sugar Barred.

Mr. Gillies then moved—

''While the pool is in operation, the Commonwealth Government to prohibit the importation of black-grown sugar, except so much as is required from time to time to make good any Australian shortage, this embargo to be applied subject to the conditions stated in clause (4) relating to price to be charged to the consumers.'' The motion was adopted.

Retail Price of Sugar—4¾d. per lb.

The Conference then considered the proposal which had been moved by Mr. Gillies, as follows:—

''That during the currency of the pool, refined sugar to be retailed at a price not exceeding 4½d. in the metropolitan towns.''

Mr. Doherty moved as an amendment that the price should be 4¾d. a lb.

Mr. Johnson seconded the amendment.

Senator Crawford did not favour the conference saying the price at which sugar could be retailed. The retail price was a matter over which they had no control; in fact, it did not very much concern them. They should say the price at which they would sell their raw sugar. He thought another alternative should be added—that of increased duties.

Mr. Johnson: Not an alternative—an addition.

Senator Crawford said he did not see how they could follow the sugar into the stores.

The Premier: How would you satisfy the Commonwealth if you do not state a price? We put in the retail price for the reason that our interests are largely concerned in what price rules. There was a difficulty in controlling the retail price, he continued, but it did not represent an insuperable difficulty. It was essential that they should be able to tell the Commonwealth what the retail price would be. At a price of £27 a ton, the pool would be left with £15 a ton to cover the whole range of costs. Those costs, some years ago, were covered by half that amount. That meant that the pool would have a fairly large sum on its hands. It was on the basis of £27 a ton for raw sugar that he had suggested a retail price of 4½d. If it were a mere question of asking for 4¾d., he would not oppose the proposal, on the understanding that if the Commonwealth did not agree to it, they would have to give the matter further consideration.

Mr. Goldfinch said, with authority, that his company could not assume control of the retail price.

Mr. Pritchard pointed to the difficulty of fixing prices on the basis of a farthing. When that had been suggested previously, it was stated that the price would be 5d. He questioned whether they should stipulate a retail price, or fix a price for 1A sugar, leaving the States the right of controlling the retail price. Natural competition would prevent the retailers from overstepping the mark.

He suggested that the motion should be altered to read—

''That 1A refined sugar should be retailed at such a price as would ensure consumers securing sugar at 4¾d. a lb. in capital cities.''

Mr. Doherty accepted Mr. Pritchard's proposed amendment, which was agreed to.

The Conference further favoured the making of an agreement between the pool and the refiners for the refining and distribution of sugar.

Allocation of Price.

On the resumption of business on the 24th January the Conference considered a proposal by Mr. Powell.

Mr. Powell proposed that the allocation of the price to be paid for raw sugar should be left in the hands of the Sugar Cane Prices Board. He was supported by Messrs. Batchelor and Aide.

Mr. Goldfinch opposed the various boards making an award, and thought that the Central Cane Prices Board should make a recommendation to whatever authority was appointed to conduct the negotiations with the refiners as to the mode in which the allocation should be made.

The Premier said that it was not necessary for the local boards to meet and make divers awards. The Central Board had power to make a recommendation to the local boards. The boards could then consider the recommendation, and if they were so disposed could make their own awards. There would always be an appeal to the Central Board. The Central Board had previously made an award based on 12 c.c.s. sugar at £21 a ton, and had from time to time allocated the proportions of each £1 a ton over that between the millers and the growers. The Central Board had power to make either a recommendation or give a direction under section 13 of the Act.

Mr. Goldfinch: For how long would the direction hold?

The Premier: The Central Board would not have power to make a direction for the whole period of five years. It would only have its present powers.

Senator Crawford suggested that the Minister for Agriculture might get the Central Board to report as to the value to be placed on the raw sugar.

Mr. Marshall said that the board would be only too happy to do all that it could to assist the industry. Personally, he would sooner the board gave a direction rather than make a recommendation.

Mr. Powell: I hope the Government will not do anything to take away the rights of the growers under the Act.

The Premier: The Government has no intention of interfering in any way. The board has certain powers and the Minister could ask the board to exercise them.

The motion was then carried, and the Conference closed.

THE FRUIT INDUSTRY.

IMPORTANT NEW REGULATIONS.

The regulations under "*The Fruit Cases Act of* 1912" have been repealed and a new set of regulations issued in place of them.

These new regulations are called the "Fruit and Vegetable Grading and Packing Regulations of 1922," and were published in the "Government Gazette" of the 3rd February, 1923.

In these regulations—

"Foreign substance" means any earthy matter, stones, gravel, &c.;

"Inspector" means an inspector appointed under "*The Diseases in Plants Act of* 1916;"

"Matured fruit" means well grown fruit with normal sugar contents;

"Sound" means free from damage or decay and free from abornmal condition in fruit or vegetables due to the presence of or caused by the operations, development, growth, or decay of any insect or fungus.

These regulations provide for the grading, packing, and marketing of fruit and vegetables for sale, and any fruit or vegetables contained in any case intended for sale shall be packed in a case made in accordance with the specific measurements as set out in a schedule in the regulations for such fruit. The regulations provide that the proportion of foreign substances, in any case or package of any fruit or vegetables, shall not exceed 3 per cent. of the total weight of the contents of such case or package, as the case may be. Any person who packs any fruit or vegetables intended for sale or sells in a package any fruit or vegetables, except in accordance with the requirements of these regulations, shall be guilty of an offence.

Again, the regulations provide that where fruit is packed, the packer of such fruit shall obliterate from the case or package within which such fruit is packed all previous markings if any; and further, that he shall mark legibly and durably on the outside of such case or cases—

(*a*) The words "guaranteed by packer to contain one Imperial bushel, or one quarter Imperial bushel," as the case may be.

(*b*) The name of the variety of the fruit and the number of such fruit, and in the case of pineapples, the grade of the fruit according to the standards as set out in Schedule 2 of the regulations.

The above markings do not apply in the case of any fruit or vegetables forwarded for manufacturing purposes to any factory, if the container of such fruit or vegetables has legibly marked on it the words "For factory use."

For any breach of these regulations, the following penalties are prescribed:—

(*a*) For a first offence a penalty not exceeding £2.

(*b*) For a second or subsequent offence a penalty not less than £2 nor more than £10.

The schedules to the regulations give the dimensions of the various approved bushel, half-bushel, and quarter-bushel cases. These are practically the same dimensions that have been in existence for some considerable time past. The schedules also provide for the following grade standards:—

Smooth-leaf Pineapples.

"Large" consist of sound, well-grown, matured specimens, giving eight to twelve fruit to the bushel case.

"Choice" consist of sound, well-grown, matured specimens, running fourteen to twenty-one fruit of even size to the bushel case.

"Firsts" consist of sound, well-grown, matured specimens, running twenty-two to twenty-eight fruit of even size to the bushel case.

"Seconds" consist of sound, matured specimens, running twenty-nine to thirty-six fruit of even size per bushel case.

Rough-leaf Pineapples.

"Choice" consist of sound, well-grown, matured specimens, running twenty-four fruit of even size per bushel case.

"Firsts" consist of sound, well-grown, matured specimens, running twenty-five to twenty-seven of even size per bushel case.

"Seconds" consist of sound, matured specimens, running twenty-eight to thirty-six of even size per bushel case.

Ripley Queens.

"Choice" consist of sound, well-grown, matured specimens, running twenty-one fruit of even size per bushel case.

"Firsts" consist of sound, well-grown, matured specimens, running twenty-four to twenty-seven fruit of even size per bushel case.

"Seconds" consist of sound, matured specimens, running twenty-eight to thirty-six fruit of even size per bushel case.

Cavendish Bananas.

"Choice" means sound fruit, free from blemish and properly packed, having a minimum length of 9 inches and a minimum circumference of 5 inches.

"Firsts" shall mean sound fruit, properly packed, having a minimum length of 7 inches and a minimum circumference of 4 inches.

"Seconds" shall mean sound fruit, properly packed, having a minimum length of 6 inches, and a minimum circumference of 3½ inches.

All measurements for length are to be taken on the outside of the curve from the junction of the fruit at the stem-end to the top of the fruit.

HOW TO KILL A FOWL.

The average person uses the axe and makes a gruesome mess of the job. The proper method, and the most humane, is to hold the two legs and the ends of the wings, passing under the body, tightly in one hand. Place one finger of the other hand across the throat and the other two (index and third fingers) across the back of the bird's head. Bend back the head sharply, and so dislocate the cervical vertebrae of the neck, and then give the head a forward pull. The latter act separates the dislocated parts, and provides a small sac, into which the blood flows. Then, with a sharp-pointed knife, perforate the sac and the blood will flow. No time must be lost, as poultry blood coagulates quickly. Dry-picking is seldom done at home. The scalding method is the quickest, even if there is a waste of feathers. The water should be just off the boil, and the bird should be immersed so as to wet all the plumage to the skin. With young, tender birds, if the water is too hot, much skin comes away with the feathers, and an unsightly result is obtained.—"Poultry."

VITICULTURE IN THE NORTH.

By W. J. ROSS, Instructor in Fruit Culture.

In the Charters Towers District much confusion as to vine nomenclature has hitherto existed, and in the course of an official visit to that area in December last, when vines were in full foliage and crop, Mr. Ross was of some assistance to the growers in determining and applying the correct names to the principal varieties cultivated in that part of the State.—Ed.

After careful study in the vineyards of the habits and character of several varieties freely grown in the Charters Towers district, and which have been known hitherto to local vignerons by largely incorrect names, success in regard to identification and naming was attained in quite a number of instances. As an example of what confusion in regard to naming means, it might be mentioned that a very excellent grape now making itself noticeable in local vineyards has, to some extent, been deprived of its full measure of credit through being identified wrongly with other comparatively inferior kinds, which have consequently enjoyed a false reputation. The variety referred to is Madresfield Court; a first-class berry, with an excellent muscat flavour and good packing qualities, and which does well in the Charters Towers area. Again, the wrong naming of varieties is likely to result in the inexperienced vigneron, or beginner in the industry, obtaining data concerning the suitability or otherwise, of varieties grown under local conditions, of a very misleading character, and it is important that such errors be corrected whenever opportunity is afforded. Included among the varieties either named wrongly or not identified by many growers are Cinsaut, Black Prince, Snow's Muscat or Muscat Hamburg, Lady Downe's Seedling, Madresfield Court, and one or two others. The most common variety at present in the district is the Royal Ascot, which is very prolific. The only drawback affecting this variety, seemingly, is its tendency to crack, should an excess of moisture resulting from frequent thunderstorms about the harvesting period be experienced. However, by the exercise of judgment in cutting, and care in handling and packing, it will carry to considerably distant markets. As much as 6 tons to the acre of this berry have been produced in the Towers area, and this year there are several crops estimated to yield over 4 tons to the acre. Nevertheless, I am of the opinion that the superiority of other less known kinds at present will displace this variety in many vineyards. Madresfield Court, for instance, bids fair to establish a reputation for Towers-grown grapes throughout the North, as up to the present its characteristics, so far as growth, bearing, and quality are concerned, has been very satisfactory. It was noted to be doing well in a number of vineyards, and the fruit being of an attractive appearance with a somewhat tough skin, constituting good packing qualities, makes it worthy of extensive planting. Another choice variety named Gordo Blanco, considered by vignerons to be one of the best, if not the best, white grape in cultivation, promises to succeed well in the Charters Towers district. Many young vines of this variety were observed making strong growth and carrying fair crops of well-set bunches with large berries in Mr. Mann's garden. Snow's Muscat, another first quality black grape, is also doing well and is entitled to a prominent position in local vineyards. Other valuable additions are:—Alicante, Cornichon, Red Frontignac, Henab Turki, and Black Prince, while from the American varieties for local market Wilder and Goethe may be selected as likely to do best.

As regards flavour and appearance Charters Towers grapes can hold their own with those from the best vineyards, and they are altogether superior to those imported from the South last season. It rests with growers themselves to show that it is not necessary to import this fruit for northern requirements at all. It must be remembered, however, that this will necessitate the exercise of good judgment in respect to the right stage of ripeness for harvesting and the avoidance of cutting bunches when too green, as was done this season by some growers. Placing immature or unripe grapes on the market is damaging to the whole industry, and the practice is therefore condemned. Care in handling and packing is essential, and as much of the bloom as is possible should be allowed to remain on the bunches, thereby improving their appearance when placed in the shop windows.

Grapes, too, must be handled with care during transit from the garden to rail or wharf, and if this is done the district can capture and maintain the whole of the northern trade from Bowen to Cooktown. It is worthy of mention that trial shipments to Cairns this season proved the foregoing contention; while wrapping each bunch in paper separately before packing demonstrated conclusively that this was the safest means of ensuring the landing of shipments in good condition.

Touching on the pruning and training of vines, I noted that there is yet much knowledge to be acquired by many growers, and it is proposed to visit the district again in season with the object of giving instruction in this branch. A tendency on the part of some growers to practice irrigation excessively was also observed, and it is proposed to make this matter the subject of a future paper.

THE MAIN ROADS BOARD.

A Year of Achievement.

On 8th March, 1920, the Main Roads Act, introduced by the Government and passed by the Queensland Parliament, received the Royal Assent. In October of the same year the Chairman, Mr. J. R. Kemp, was appointed. Early in 1921 other members of the Board—Messrs. J. A. Fraser and D. A. Crawford—were appointed. The first meeting was held on the 1st February of that year. The mapping out of an administrative system, the collection of data, and a general survey of rural road requirements had already been made, and the Board proceeded to carry out its plans. To-day the Main Roads Board is a forceful factor in the Queensland Government's general scheme for enriching rural life; its initials, "M.R.B.," are becoming one of the State's best known sign posts, and is already accepted as a symbol of and a synonym for sound and enduring highway construction.

Prior to the institution of the Main Roads Board very little had been done in Queensland by Local Authorities on permanent road construction. The fact that only a very small percentage of shires were able to furnish copies of specifications or drawings of standard road profiles when required by the Board indicated that local road construction hitherto had not been governed by any set plan. Taking a given year, 1918-1919, though the general rate revenue of Queensland shires approximated £450,000, very little sound road construction was done in most of the districts covered by a wide inspectional itinerary.

In the first annual report of the Board, covering the activities of the year ended 30th June, 1922, and which is just to hand, there is much valuable material, and it is worth the study of all interested in vigorous development of the State. The march of the motor vehicle compels greater attention to facilitation of inland transport and all that it means to rural dwellers who have hitherto lived beyond the range of the petrol patrol.

The following notes on the roads of Queensland and plans for their improvement, together with the accompanying illustrations, are taken from the Board's report:—

Condition of Queensland Roads.

With the exception of one or two roads constructed some twenty years ago and roads constructed under Acts of the early sixties, very little attempt has been made to construct roads on a systematic plan, and even where such roads have been constructed, the efforts of the Local Authority to maintain them have, in many instances, been ill-directed. Examples of these old roads exist in the old Gympie and Maryborough road and in the Brisbane-Warwick road.

These roads have rough pitched Telford or corduroy foundations—that is, a foundation of spalls wedged together or of timber logs which originally was capped with broken metal but is now worn away—with the result that traffic will not use the rough foundation. Where the surface has been replaced the metal has been crowned up so high that vehicles side-skid badly. Local Authorities have, in many instances, completely neglected to maintain *through roads;* bridges have been allowed to tumble down and have not been replaced. The reason for this neglect is obviously, in most cases, that no rate revenue is derivable from the adjoining lands, and the Councils have not felt it their duty to maintain roads for traffic whose origin is outside their area, but other cases exist where the road has been superseded by a railway. When such roads become "Main" this state of things will be remedied. The maintenance and reconstruction costs to be borne by the Local Authorities amount to one-half the total, and the Board has power to apportion part of such costs to the Local Authorities benefiting, even though the road is outside their area.

Plate 31.—Blacksoil Road on the Darling Downs Cut Up by Wheel Traffic during Wet Weather.

Plate 32.—Blacksoil Road on the Darling Downs in a Bad State through Neglect of Maintenance.

Many Local Authorities do not appear to recognise that road making is a specialist's job. Instances may be quoted of long and expensive cuttings having been excavated in an attempt to improve the road. The result has been merely to obtain the same grade as before without any compensating advantage. The employment of a qualified engineer in such a case would have resulted in vast improvement to the grade at a much lessened cost and without restricting traffic to a narrow drain cutting.

No real attempt in the past has been made to locate roads on scientific principles, the result being that numerous deviations are now necessary.

PLATE 33.—SHOWING ONE METHOD OF ROAD CONSTRUCTION AS PRACTISED IN SOME SHIRES.

The pioneer surveyors must not, however, be too severely criticised on that account, as funds were seldom available for conctructing the road on its proper location. The primary consideration of the surveyor was to locate an accessible road which would have a level cross section (irrespective of longitudinal grade) thus, for the time being, obviating any expenditure other than that for grubbing and clearing.

Reciprocity between the Survey Branch of the Lands Department and this Board has now been established which it is hoped will in the future render the re-location of Main Roads unnecessary in country to be opened for settlement. Satisfactory re-location within the boundaries of a surveyed road may be possible at times.

Numerous cases exist in each of the divisions of the State where roads have been laid out on grades of 1 in 10 or thereabout, with pinches as steep as 1 in 6. At a later date attempts have been made to eliminate the steeper portions. The final result has been the spending of large sums of money on roads having grades of 1 in 10. Such grades are the cause of continued heavy maintenance charges, and most severely limit the loads. Metalling quickly disappears on them owing to the heavy tearing action of wheels and horses' hoofs, combined with the rush of water during heavy rains.

The expenditure of not much greater sums of money, in many notable instances, would have resulted in properly located roads with maximum grades of 1 in 20. The Toll Bar road which rises from the lowlands to Toowoomba is an example. Grades not exceeding 1 in 20 could have been obtained in lieu of the present range road (which is steep and expensive to maintain) without increasing the total distance between Toowoomba and Helidon. This would have had the great advantage of also eliminating a section of road along the sticky black soil flats and would have given equally good access.

The effect of steepness of grade upon the life of a macadam or other road is very marked. Roads constructed in Southern Queensland some few years ago on

PLATE 34.—SHOWING DAMAGE TO ROAD BY BAD FOUNDATION AND EXCESSIVE LOADS.

grades of 1 in 10 or 1 in 12 in substantial fashion with broken metal are at the present time in a deplorable condition, whilst other portions not so well constructed but on easy grades are in fairly good order.

The increase in the cost of haulage by animal traction with increases of grade is approximately as follow:—

> If costs on a grade 1 in 60 are 1s. per ton mile, then on grade 1 in 20 they will be 2s. per ton mile, and on grade 1 in 10 they will be 5s. 6d. per ton mile.

It is highly undesirable to construct new main roads on gradients steeper than 1 in 20, unless very special circumstances exist.

The saving in time of travel due to improved roads has the same effect as bringing the producer nearer the market and the traveller nearer his objective.

A recognised principle in land valuation is that, other things being equal, the values decrease as the distance from railway or markets increase. Assuming for the moment that a property 10 miles from a market is worth less than a similar one adjacent thereto by an amount of £3 per acre, it is certain that a reduction in the time of travel by one-half would have the same effect as bringing the market within 5 miles of the farm and raising its value by 30s. per acre.

Some such reduction in the time of travel undoubtedly follows proper road construction.

The black soils of the Darling Downs present conditions after rain which could hardly be worse. The soil when wet has an exceedingly low bearing strength and is particularly sticky. Most of the roads are almost impassable after rain, but occasionally a sound piece of road which has originally been solidly constructed is met. Failure of the previously constructed roads has been due to—

(*a*) Improper selection of material.

(*b*) Insufficient thickness of good stone.

(*c*) Non-regulation of loads.

The existing roads leading to Tambourine, Beechmount, Maleny, Montville, and other rich fruitgrowing or dairying districts are all badly constructed on steep grades, whilst in North Queensland the great dairying and timber areas are almost roadless.

The settlers of these districts undoubtedly suffer hardship and loss by reason of the lack of decent roads, and the Board has therefore devoted special attention to the early alleviation of present conditions.

Proposed Improvements.

The hopelessness of ever constructing and maintaining roads in the hilly and mountainous areas within the existing road boundaries on account of the excessively steep grades was most apparent to the Board, and a similar fact was also noted by the Victorian Roads Board in its first annual report on Gippsland roads.

In *many instances the only construction on Main Roads which at the present day will be warranted* is the improvement of creek and river crossings, as in much of the Western Downs and Plains, or clearing and light gravelled formation, as on the Coastal Plains; but, in others, nothing short of solid construction (as on black soil of the Downs) or of side cutting and metalling in wet mountainous country will suffice.

The funds at the Board's disposal will be expended upon works of an enduring nature, and first and foremost under this heading comes *drainage*. Correct location and proper surfacing is next in importance, for though the surface of a road may wear out, the value of the grade remains.

The subject of drainage is of immense importance, especially in the Coastal and hinterland regions of Queensland, where the annual rainfall varies from 60 to 200 inches per annum, and where over 30 inches in twenty-four hours have been recorded.

It does not follow that with the funds available the best results would be obtained by building a small mileage of wide surfaced roads, but rather that the best economic results to the community would follow the building of greater lengths to a narrower standard; but all loan money should be spent on enduring features.

The effect of improvement of surface in reducing tractive effort (and consequent cost of haulage) is illustrated in the following table (Bulletin 463, Department of Agriculture, U.S.A.):—

Gradient Level.	Load which a 1,200 lb. horse can haul continuously.
Deep sand	760 lb.
Dry earth	1,600 lb.
Firm earth or sand clay	2,285 lb.
Gravel (average)	3,000 lb.
Macadam (first class)	4,365 lb.

The lesser intensity of pressure upon a foundation the greater the strength and lasting qualities of the road. An increase in the thickness of crust from 7 inches to 10 inches results in an increase in the strength of the road by *100 per cent.* for an increase of surfacing cost of *42 per cent.*, which goes to show that it is bad policy to skimp the crust thickness of roads.

Type of Road Surfaces.

The type of surface paving to be adopted depends upon—

(*a*) The class and volume of traffic, and cost of the various materials available.

(*b*) The maintenance costs per mile for each class of material available.

The sweeping statement is often made that this or that class of paving material is the only one which should be used, but the absurdity of using, say, concrete as a paving material on a road carrying a small tonnage per annum in place of a cheaper gravel or macadam is self-evident.

Plate 35.—Damage caused by Wheel Traffic owing to Insufficient Thickness of Material.

Plate 36.—Coastal Range—Road on a Grade, 1 in 3, Much Gutted by Rain.

The problem of selection of type of paving material resolves itself into whether the cost of maintenance of the cheaper pavement, plus interest and redemption on the capital cost (based on its lesser life), will exceed the annual interest and redemption on capital cost plus maintenance charges on longer-lived more expensive pavement.

The use of local material should always be first considered.

Road Materials.

The points to be observed in the selection of road metal are—

(1) Hardness.

(2) Toughness.

(3) Cementing value.

In the absence of any practical knowledge of the value of a stone for road-making purposes, microscopic examination will reveal its structure, mineral composition and state of decay, and attrition and crushing tests will determine its possibilities for wear. These tests as occasion demands are being carried out at the Queensland University.

The use of a strong binder with good cementing qualities is as essential as the use of good stone. The use of vegetable debris or clay as a binder results in the early destruction of the surface by ravelling during dry weather, and by formation of mud in wet weather.

For this reason screening plant should always be employed in conjunction with crushers so as to obtain suitable binder.

Quarries are being developed by the Board at the present time on the Atherton Tableland, Darling Downs, Lowood, and Rockhampton Districts.

Maintenance of any type of surface should be extensive enough to at all times keep the foundation or bottom course protected from wear.

For similar volumes of traffic, steepness of grades, efficiency of drainage, and weather conditions, the maintenance of loam surfaces will in general be more costly than gravel, gravel than broken stone, and broken stone more costly than tar macadam or concrete, but the selection of pavement type must be left to the designer, who should consider the factors mentioned in every case.

The tarring of macadam surfaces costs from 2d. to 8d. per square yard, and is an economical form of surfacing where the traffic is dense.

Mountain Roads.

Mountain roads require a great deal of care in fixing the centre line. Unless the question be thoroughly investigated a great volume of earth work may be unnecessarily excavated, hence in very steep broken country contour plans along the trial grade are being prepared in most cases so that the correct position of the centre line (taking into consideration road widths, horizontal curvature limits, &c.) may be determined. The extra survey and drawing office costs are offsetted many times over by the saving in earth work.

Bridges, Culverts, Inverts.

The construction and maintenance of bridges, culverts, and inverts come within the ambit of the Board's functions, and here again the type to be adopted is being considered strictly upon the requirements.

There is a tendency at the present day to almost exclusively utilise reinforced concrete in the construction of highway bridges, but the problem of type resolves itself into—

"What sum of money invested now would build and maintain a reinforced concrete structure having an indefinite life?

"What sum of money invested now would provide for the erection and *maintenance* of timber or steel structures having a limited life, and renew such structure at similar limited intervals, in perpetuity, taking into account possible increments of cost and inconvenience to the travelling public during re-erection?

"Whether a bridge should be high or low level, beam, or truss, depends upon the local conditions."

The widths adopted will be either 12, 16, or 18 clear feet, depending upon the volume and class of traffic and length of bridge.

Plate 37.—Metalling all Removed by Heavy Rains on Steep Grade.

Plate 38.—Bridge in a Bad State through neglect of Maintenance.

The high torrential rainfall, in some cases amounting to 33 inches in twenty-four hours in the coastal districts of Queensland, renders the construction of low level bridges a necessity, for often the cost of a high level bridge would be prohibitive. Care in the location of the approaches to low level bridges is very necessary. Most of those in existence have unnecessarily steep gradients.

Road Widths.

As before explained, these will to a large extent, especially in side cutting in steep to moderately steep country, be governed by the amount of money available or likely to be available for construction. This is a function of the likely traffic.

In general, surfaced roads may be divided into two types—single and double tracks. Refuges at frequent intervals are required on single track roads, so that vehicles may pass each other in safety.

Carts vary in width from 5 feet to 6 feet.

Cars vary in width from 6 feet 6 inches to 6 feet 8 inches.

Carts frequently have frames for loading hay, &c., upon them. The minimum width of metalled or gravelled surface for single tracks should be not less than *9 feet* and for double tracks *15 feet.*

The provision of a metalled or gravelled surface requires an extra width for shouldering with selected material and for water tables, otherwise the metal would push outwards, and the road would quickly loose its shape and value.

The designer should always look to the future, and although a road may not be metalled as soon as constructed, it generally will be within a reasonable period. Hence it is desirable that the earthwork should not be narrower on single track roads than *17 feet,* except in special cases, and on double tracks than *23 feet.* Pioneer roads may be as narrow as 12 feet overall.

The clearing and grubbing forms a substantial part of the cost of the work in scrub country. Very little benefit will ever be incurred in increasing the width of hardened surface of a single track road beyond 12 feet or 20 feet overall (in side cutting).

This maximum width is desirable when funds permit, as it gives a wider surface to travel over with less risk of wheel tracking, and also minimises the risk of the wheels getting close to the edge and damaging the metal.

In cases where funds do not permit of 12 feet of hardened surface, 9 feet may be adopted, flanks being of selected material and the total width of side cutting reduced to 17 feet where the road is in earth and 15 feet where rock occurs on the inside watertable.

The great tendency on surfaced roads is for teamsters to get one wheel off the metal when descending a grade in order to brake the vehicle, and this has an especially destructive effect on the narrower roads. For this reason it is desirable to ease the grades so that this will not be necessary. Great saving in the maintenance of metalled roads is the result.

Where the gradients are very easy (from 1 in 30 and easier) and the traffic light, there should not be so much objection to the narrower type of single track metalled road.

Where refuges are provided on a single track metalled road, they should be metalled and the curved approaches to them similarly treated, so that the edges of the metal will not be damaged by vehicles pulling off. The metalling should always be widened out, and should extend to the watertable on the inside of sharp curves for the same reason. By carefully considering these facts, great economy in construction and maintenance may be effected.

Where the earthworks are light, as in flat or slightly *undulating* country, the saving in first cost by the narrowing of the formation is not so great, and in general the width *should* be not less than indicated on the diagram accompanying the Board's specification.

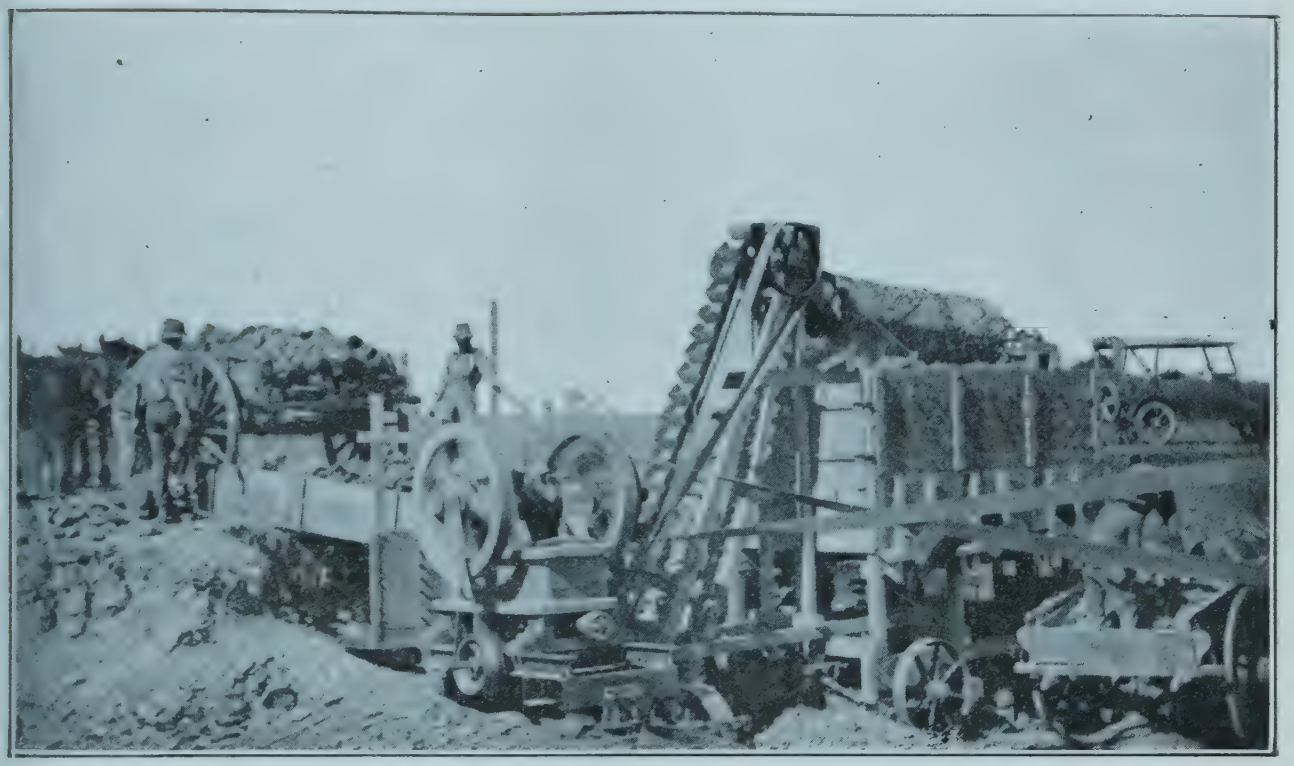


Plate 39.—Portable Metal-Crushing Plant, Darling Downs.

Plate 40.—Showing Intermediate Course of Metal and Flanks being Rolled with a 5-ton Water-Ballasted Roller.

The standards contained therein have been designed to meet each particular case, and the selection of the correct type in each instance must be left to the judgment of the designer.

Pioneer roads or intercommunication routes passing long distances through poor country should be reduced in overall width to about 12 feet on side cutting.

Road Drainage.—This is of the greatest importance, and special note of this matter is made in the general instructions to engineers, and in the Standard Specification.

The first essential of metalled or gravelled roads is that the foundation be kept dry. This is accomplished—

(*a*) By proper catch drains, water tabling, and diversion of water therefrom at frequent suitable points.

(*b*) By open spall mitre drains under the road bed.

(*c*) By filling the voids of the top course with strong binder and rolling to a smooth, nearly waterproof, compact surface.

Proper care must be taken to ensure that material which may become water-logged, such as clay, is not used within at least 6 inches of the underside of the metal or gravel.

Horizontal Curvature Limits.

The limits of curvature on any particular road is bound up with the capital cost for, in the case of mountain roads intersected by gullies and with projecting spurs, the cost rapidly increases with increase of the radii of curves owing to the heavier cuts and fills involved.

The Board has adopted as the irreducible minimum radii of 80 feet around gullies and 100 feet around spurs, for otherwise the risks of accident would be too great and the utility of the road seriously impaired, and has provided that the gradients around curves must be so eased as to make tractive resistance at least not greater than on straights. The case is not quite similar to grade compensation in railroad construction, as upon the length and radius of a road curve depend—

(*a*) Line of sight, and

(*b*) The percentage of animals in the team which are thrown out of effective action.

This grade compensation also provides for future easing of curves, which results in shortening the length and steepening the grade. The grade compensation provided for in the original plan will thus allow of the ruling vertical gradient not being exceeded if future improvements are undertaken. In flat or easy country the radius of curvature should be as great as possible, without incurring heavy expense in land resumption.

It is often argued that the limitation of curvature on mountain roads is unwarranted, and the case of the short radii adopted in cities is quoted. It must, however, be remembered that resumption costs for cutting off all corners in cities would often be prohibitive, and secondly, that the line of sight is very much greater than would be the case with a similar radius around a spur on a mountain road, consequently the cases are not parallel.

On roads where there will be a fair proportion of fast to moderately fast traffic a line of sight of 200 feet is desirable, but this is seldom attainable in mountain roads.

In general, the steeper the grade the greater the necessity for care in this direction, as speed control is more difficult on the steeper grades.

Plate 41.—Maintenance—Resurfacing recently done on a Main Road.

Plate 42.—Showing Old Road and New Road below—Now under Construction.

AGRICULTURAL EDUCATION.

Queensland and California Compared.

"California is one of the few American States whose general conditions resemble those of Queensland; and it is regarded as one of the most progressive States in the Union.

"I have long realised the great necessity in Queensland for a strong and well-organised system of vocational and rural schools, and the desirability of the University playing a much more leading part than it does in the solving of our agricultural problems and the development of our primary resources.

"American vocational schools which specialise on the agricultural side are now conducted on much the same lines as Queensland's rural schools. The system of extensive field work and farm operations at these schools has been discontinued, but the science work has been much strengthened.

"Queensland rural schools largely confine outside work to observation, and American experience proves that this policy is a sound one."

MR. J. D. STORY.

Late in January, Mr. J. D. Story, Public Service Commissioner and Chairman of the Administrative Committee of the Council of Agriculture, returned from California, whither he had gone to investigate on behalf of the Queensland Government, the various aspects of agriculture.

"I had long desired," said Mr. Story, in the course of a Press interview, "to visit California to see the educational and other kindred institutions of that State. California is one of the few American States whose general conditions resemble those of Queensland; and it is regarded as one of the most progressive States of the Union."

Mr. Story added that while being familiar with the leading Australian institutions, he had been particularly anxious to get into closer touch with some of America's vocational schools, and the organisation and ramifications of a typical Union University, which had attached to it a well developed College of Agriculture.

"As to primary and secondary education, I am convinced that Australia holds her own quite well in the essential subjects. In fact, several educators with whom I discussed matters expressed the opinion that Australian students who have gone to California to take special courses in local universities more than held their own in English and mathematics. In Queensland we do not indulge to the same extent in 'extra' subjects that the Americans do, but I think that Queensland would be well advised to continue to adhere to the essentials.

"I have long realised," he went on, "the great necessity in Queensland for a strong and well organised system of vocational and rural schools, and the desirability of the University playing a much more leading part than it does in the solving of our agricultural problems and the development of our primary resources. That the University has not done so to any great extent is not the fault of the University; funds had been lacking. We cannot be unmindful that the maintaining of technical departments and officials, in common with other departments and officials, falls upon the State, and that upon the State also devolves the main burden of the financing of the University. These facts give rise to the feeling that as the University and the State technical departments continue to develop, overlapping and unnecessary expenditure might ensue, unless adequate precautions are taken. The need that this possible overlapping and unnecessary expenditure should be avoided, consistently with the efficient discharge by each section of its proper functions, has come home to me with greater force since I have assumed the duties of Public Service Commissioner.

"These thoughts in turn suggest that in their development technical departments should not forget that the University exists," he went on; "that the University in turn should not forget that the technical departments exist; but that each section should realise that a close and friendly relationship, with clear ideas as to the functions of each section, should be established and maintained."

American vocational schools which specialise on the agricultural side were now conducted on much the same lines as Queensland's rural schools. The system of extensive field work and farm operations at these schools had been discontinued, but the science work had been much strengthened. Queensland rural schools largely confined outside work to observation work, and American experience proved that this policy was a sound one. In California, the home project system had been found to be very effective. Under this system, the lad conducted certain approved work at his home under expert supervision in one of such subjects as the raising of pigs, poultry, the growing of vegetables, potatoes, maize. The work done was spoken of very favourably by the officers of the Department of Agriculture, by the County Farm Advisers, and by many members of the College of Agriculture. The system was said to have many good points; it was economical, inasmuch as it obviated the finding out of public funds of large sums for the acquiring of agricultural sites; for the erection of special buildings; for the providing of equipment; for the cost of upkeep, and other charges. Further, it overcame the difficulty of having to make special arrangements for the field work, care of plant and animals, during the school vacations. It was held also that the system made the lad interested in a project at his own farm home, and tended to make the home interested in the special work of the lad. Certainly the system had much to commend it.

So far as they had gone in their systematic efforts for the training of apprentices, the American Federal and State authorities, after being given an outline of the schemes, had had to admit that Queensland was ahead of them.

Delving for fundamentals, Mr. Story found that in regard to the agricultural industry of the United States, four authorities were concerned:—

1. The Federal Department of Agriculture, which dealt with research and investigation, and the enforcement of Federal laws concerning quarantine, pest control and standardisation.

2. The State Department of Agriculture which was regarded as the State's "watchdog" of agriculture, and whose main functions were the enforcing of the State laws and regulations relating to the industry.

3. The county, which appointed and paid the horticultural commissioners, who dealt particularly with the plant industry of the country.

4. The University College of Agriculture, whose functions were three-fold—namely, research and investigation; resident instruction, and non-resident instruction, popularly known as "agricultural extension." The "extension" work was conducted through representatives of the college known as county farm advisers. The main work of these advisers was educational, and consisted in making available to the farmers information gathered and discovered by the Federal Department of Agriculture through its various bureaux and divisions, and by the College of Agriculture through its experiment stations, research laboratories, and other accessories.

It was somewhat surprising to find that the functions of the University College of Agriculture were so far-reaching; the work embraced the full-degree course in agriculture, farm diploma courses, and periodic weekly and fortnightly courses in special subjects for farmers. As was generally known, California had adopted a high grade of "standardisation." The effective carrying out of this system increased the percentage of "culls." The question then arose as to how to make some commercial use of the culls. The fruit products laboratory was established for the purpose, and it seemed to be doing good work. In Queensland they were now adopting a system of standardisation, and they would be faced with the same difficulties regarding culls. Would their University be enabled to help the primary producers to make some commercial use of their culls, and of present waste products? Therein lay a fine opportunity for good work.

Succeeding issues will contain more detailed accounts of the results of Mr. Story's studies and investigations of Californian conditions, in relation particularly to the organising, administrative, and instructional activities of the agricultural industry.

COTTON CULTURE.

Mr. W. G. Wells (Government cotton specialist), after a prolonged study tour of the Queensland cotton areas, is of opinion that the cotton-growers of this State are not realising the necessity for the proper cultivation of the seed beds and the cultivation of the crops generally. The latter he has found to be true in practically every district he has visited.

Best Methods—Advice to Growers.

In the course of an account of his cotton crop studies to the Press, Mr. Wells said that farm after farm was visited, and in nearly every case where the pigweed and summer grass had been allowed to grow, the cotton plants were suffering from lack of moisture. The growers with such crops complained of the droughty conditions, but did not seem to be inclined to blame their poor methods of cultivation as being contributory causes to the dry condition of the plants. In nearly every district farmers were to be found who had thoroughly cultivated their crops from the time the plants had sprouted through the earth, and, while it was true that several of such crops were commencing to show signs of the effects of the drought, there was no comparison as a rule with such crops and the crops in the adjoining fields where the weeds had been allowed to grow.

Good Culivation Wins.

The well-cultivated crops were laden with large, well-developed bolls, and only needed good rains to continue the development of the bolls which were aready on the plant, the formation of new flower buds (squares), and new growth of the main stalk and fruiting branches. Many of the growers seemed to have overlooked the fact where the well-laden and cultivated plants were showing signs of suffering from lack of moisture that the crop of bolls and squares was absorbing the available moisture. It was not a case, at all, where the advised methods of cultivation had failed, and the plants were in the same condition as uncultivated fields, because in one case the crop of bolls was taking the moisture, while in the other case it was the weeds. Several crops were inspected which had been cleaned up and well cultivated within the previous week, and the plants were not freshening up and developing as the grower had expected. The fact had been overlooked that the pigweed and grass had been utilising a tremendous amount of the available moisture during the development of their growth, and, while their destruction had left the remaining moisture for the cotton plants, the damage had been done, and a good rain was needed to replenish the supply which the weeds had taken. A few fields were found where even under weedy conditions the plants were developing a fine crop of bolls and squares, and gave promise of producing very fine yields. This was due to the crop having had recent rains, or to the soil being particularly resistant to drought. The growers did not seem to realise that they were not taking advantage of fortunate circumstances to produce a maximum yield under such droughty conditions, but were satisfied that their crops were above the average for their district, and were not suffering from the drought.

Best Methods Necessary.

It should be remembered that under such droughty conditions as had prevailed this year in several of the districts that the very best methods of cultivation were necessary to insure the proper development of the plants, and more particularly the seed cotton in the bolls. The fact that a plant had several large bolls and seemed to be resisting the drought somewhat was no indication that the fibres within the bolls were developing properly.

Unless there was the proper amount of moisture being secured the fibres in all probability would be weak and irregular in length—characters which were very undesirable, and which lessened the value of cotton to a marked degree.

It was only by conserving all available moisture in the soil for the use of the cotton plants that these defects could be hoped to be overcome in seasons when droughty conditions prevailed, and the grower who persisted in following the poor methods of cultivation, which seemed to be in vogue at present, was certainly not going to secure profitable returns, and was doing the cotton industry of Queensland a very serious injury, and one which might severely restrict the industry from developing into the proportions which the natural facilities at present seemed to indicate possible.

Careless Cultivation is Expensive.

It was only by continuous cultivation and chipping of the weeds in the drill that the crop could be kept under control. When the periods of continuous rains set in, such crops were in a condition to go until the rains ceased without any serious damage being done, whereas fields which had not been kept clean before the rains set in presented a serious problem when it was possible to cultivate after the rains were over. The expense was also greater in destroying the older weeds, as much of it would have to be done by hand before a "scarifier" could be used between the rows to work up a good mulch, whereas a crop with young weeds could be quickly cultivated and more of the moisture retained. It was not appreciated, nor did it seem to be understood by the average farmer, that the soil should be cultivated after every rain of enough severity to destroy a good dust mulch. As soon as the rain sealed the mulch, and the surface crust was formed, the sun was apt to draw the moisture from the soil at a remarkable rate, and it was only by establishing a good mulch again at the earliest possible moment that this loss of moisture could be lessened. It could thus be seen that when the cultivation was delayed for a week or more after it was possible to work the soil that an immense damage had been done to the plants—especially in districts where the rains were uncertain and every point of moisture should be conserved.

SHOW DATES FOR 1923.

Stanthorpe: 7th to 9th February.
Warwick: 13th, 14th, and 15th February.
Allora. 20th and 21st February.
Clifton: 28th February and 1st March.
Goombungee: 22nd March.
Herberton: 2nd and 3rd April.
Pittsworth: 4th April.
Chinchilla: 10th and 11th April.
Goondiwindi: 10th and 11th April.
Killarney: 11th and 12th April.
Esk: 11th and 12th April.
Toowoomba: 17th and 19th April.
Taroom: 23rd and 25th April.
Kingaroy: 26th and 27th April.
Maleny: 26th and 27th April.
Miriam Vale: 26th and 27th April.
Dalby: 2nd and 3rd May.
Toogoolawah: 3rd and 4th May.
Nanango: 3rd and 4th May.
Boonah: 9th and 10th May.
Blackall: 9th and 10th May.
Wondai: 10th and 11th May.
Roma: 15th and 16th May.
Emerald: 16th and 17th April.
Murgon: 17th and 18th May.
Wallumbilla: 22nd and 23rd May.
Ipswich: 23rd and 24th May.
Kilkivan. 23rd and 24th May.
Springsure: 23rd and 24th May.
Beaudesert. 29th and 30th May.
Marburg: 2nd to 4th June.
Mackay: 4th and 7th June.
Woombye: 20th and 21st June.
Lowood: 22nd and 23rd June.
Rockhampton: 21st to 23rd June.
Kilcoy: 28th and 29th June.
Ithaca: 29th and 30th June.
Woodford: 11th and 12th July.
Wellington Point: 14th July.
Caboolture: 19th and 20th July.
Mount Gravatt: 21st July.
Barcaldine: 24th and 25th July.
Rosewood: 25th and 26th July.
Pine Rivers: 27th and 28th July.
Crow's Nest: 31st July and 1st August.
Sandgate: 3rd and 4th August.
Brisbane Royal National: 6th to 11th August.
Belmont: 18th August.
Wynnum: 31st August and 1st September.
Zillmere: 8th September
Laidley: 13th and 14th September.
Beenleigh: 20th and 21st September.
Rocklea: 22nd September.
Toombul: 28th and 29th September.
Kenilworth: 4th October.
Ascot: 24th October.
Pomona: 21st and 22nd November.
Millaa Millaa: 23rd and 24th November.

EFFECTIVE PIG FENCE.

A request from a settler for a pig-proof fence leads to the reproduction of the stub fence illustrated herewith. Stub fences, however, are used in timber country, not only for pigs, but for sheep-yards and bull-yards. The stub fence is regarded as the only one which will keep pigs confined with certainty. Stout wire is all right for a certain time, but big sows will eventually worry their way through. The stubs are usually cut from old rails, the height for a pig fence being about 3 feet 6 inches. The posts are put in about 12 feet apart, and a trench dug between them about 6 inches wide and 6 inches to 9 inches deep. No. 8 fencing wire is used at the top and bottom of the stubs at a distance of 9 inches from the top and 9 inches from the ground. Two wires are used at both top and bottom, the wires running through separate holes about 2 inches apart. These wires are fastened to a post at one end and to a heavy stone or logs (fig. 1) at the other end, so that they will always

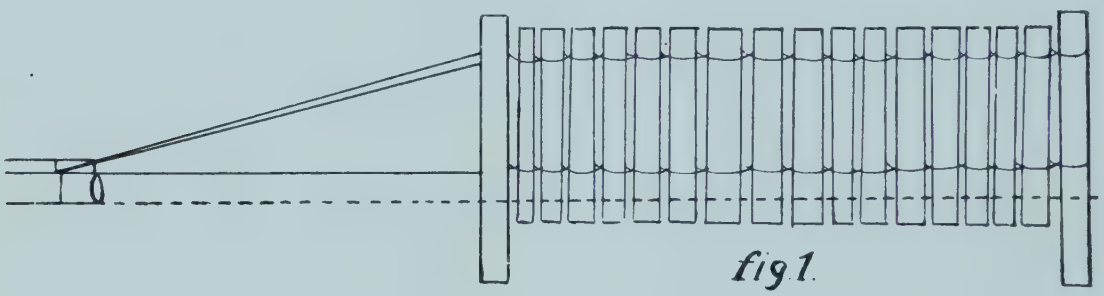


fig 1.

be tight. The stubs are put in the trench, and the wire is twisted with a bar. This is done for every stub, forming a separate loop round each one, and so keeping them tight in position. Stub fences cost more than wire fences, but last longer. One drawback to their use is that they harbour insects. For the two lower wires barbed wire is sometimes used, and is found very effective. Another good style of stub fence is used in timber country for larger stock than pigs. The stubs or saplings are let into the ground about 18 inches in a trench, and rammed tightly while upright. Two wires are then run from the starting post, A (fig. 2), to a

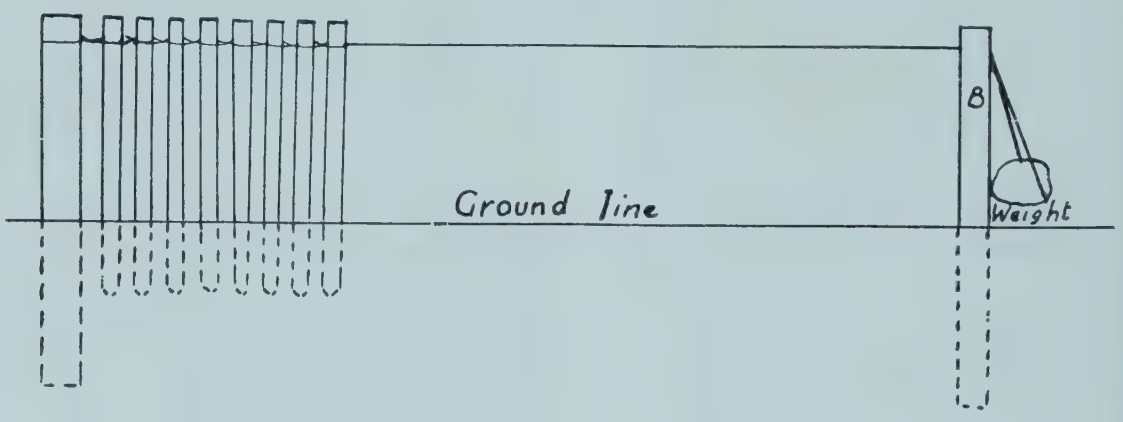


fig 2.

temporary post B, in the alignment. The wires are weighted at the temporary post to keep them taut. As each stub is put between the wires they are twisted tightly three or four times, but in opposite directions, between each stub. The stubs are afterwards sawn off level along the top, on which, if the fence is to hold large cattle, a batten is fastened to prevent stock being spiked if jumping over. The wires are eventually strained as tightly as possible to the end post when finishing off the line.—"Australasian."

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, JANUARY, 1923.

Owing to the extreme heat, the competition birds experienced a very trying time during the latter part of the month. Owing to the number of birds in moult, there was a falling off in the laying during the month. The laying of the group pens was satisfactory, considering the number of broodies in this section, as compared with the birds in single pens. There were two deaths in January—one in the light breeds from ovarian trouble, and one in the heavies from apoplexy. A number of the leading pens are still laying well. Mr. N. A. Singer made the highest score for the month with 153 eggs, Messrs. W. and G. W. Hindes coming second with 142 in the light breeds, while in the heavy breeds Mr. Burns was first with 140 eggs. The following are the individual records:—

Competitors.	Breed.	Jan.	Total.
LIGHT BREEDS.			
*N. A. Singer	White Leghorns	153	1,383
C. H. Singer	Do.	138	1,326
*W. and G. W. Hindes	Do.	142	1,246
*Bathurst Poultry Farm	Do.	110	1,156
*R. Gill	Do.	136	1,133
*S. L. Grenier	Do.	121	1,119
*G. Trapp	Do.	121	1,115
*J. M. Manson	Do.	126	1,108
*Mrs. L. Andersen	Do.	119	1,096
*W. Becker	Do.	111	1,095
*H. P. Clarke	Do.	127	1,094
*J. W. Newton	Do.	125	1,078
*W. A. Wilson	Do.	90	1,071
J. H. Jones	Do.	101	1,039
*C. Goos	Do.	117	1,037
*G. Williams	Do.	104	1,030
*R. C. Cole	Do.	110	1,023
*Oakleigh Poultry Farm	Do.	109	1,014
*T. Fanning	Do.	68	1,011
*R. C. J. Turner	Do.	113	1,009
A. G. C. Wenck	Do.	89	1,005
*F. Birchall	Do.	127	994
*Mrs. R. Hodge	Do.	102	992
*O. Goos	Do.	85	985
*H. Fraser	Do.	94	969
N. J. Nairn	Do.	86	943
*Mrs. E. White	Do.	98	941
*J. W. Short	Do.	79	938
*Thos. Taylor	Do.	100	933
*M. F. Newberry	Do.	69	928
T. H. Craig	Do.	111	924
B. Hawkins	Do.	71	914
*C. M. Pickering	Do.	74	907
*E. A. Smith	Do.	94	886
A. Maslin	Do.	79	885
J. Purnell	Do.	59	881
G. F. Richardson	Do.	71	837
B. C. Bartlem	Do.	74	830
E. Stephenson	Do.	82	829
E. Symons	Do.	90	825
H. Trappett	Brown Leghorns	93	812
Brampton Poultry Farm	White Leghorns	80	785
A. Anders	Do.	78	779
Parisian Poultry Farm	Brown Leghorns	61	530

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	Jan.	Total.
HEAVY BREEDS.			
*R. Burns	Black Orpingtons ...	140	1,240
*A. E. Walters	Do.	81	1,072
*T. Hindley	Do.	76	1,020
*C. C. Dennis	Do.	85	993
*E. F. Dennis	Do.	102	972
*R. Holmes	Do.	74	968
Jas. Hutton	Do.	104	966
Mrs. A. Kent	Do.	77	945
Mrs. A. E. Gallagher	Do.	87	928
*H. M. Chaille	Do.	57	918
R. Innes	Do.	96	896
Mrs. L. Maund	Do.	101	876
H. B. Stephens	Do.	90	866
*Jas. Potter	Do.	68	858
Wambo Poultry Farm	Do.	81	817
*Parisian Poultry Farm	Do.	88	816
W. Becker	Chinese Langshans ...	67	816
V. J. Rye	Black Orpingtons ...	75	804
*Rev. A. McAllister	Do.	66	803
C. Doan	Do.	65	800
Jas. Hitchcock	Do.	60	766
C. Rosenthal	Do.	67	727
W. C. Trapp	Do.	66	684
R. Burns	Silver-laced Wyandottes	60	649
*J. E. Smith	Plymouth Rocks ...	38	569
*Miss L. Hart	Rhode Island Reds ...	50	493
Total	...	6,408	65,697

* Indicates that the pen is being tested singly.

DETAILS OF SINGLE HEN PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total
LIGHT BREEDS.							
N. A. Singer	206	261	213	240	219	244	1,383
W. and G. W. Hindes .. .	211	201	213	200	218	203	1,246
Bathurst Poultry Farm	156	179	209	201	225	186	1,156
R. Gill	206	201	208	195	150	173	1,133
S. L. Grenier	173	152	193	195	202	204	1,119
Geo. Trapp	195	176	192	202	166	184	1,115
J. M. Manson	191	161	188	172	208	188	1,108
Mrs. L. Andersen	210	155	191	178	187	175	1,096
W. Becker	180	150	194	179	189	203	1,095
H. P Clarke	182	168	184	200	178	182	1,094
J. W. Newton	194	187	208	165	184	140	1,078
W. A. Wilson	185	165	146	191	186	198	1,071
C. Goos	132	160	169	186	217	173	1,037
G. Williams	160	175	193	178	172	152	1,030
R. C. Cole	202	154	189	145	165	168	1,023
Oakleigh Poultry Farm .. .	181	152	182	157	163	179	1,014
T. Fanning	133	171	186	169	219	133	1,011
R. C. J. Turner	182	153	182	174	176	142	1,009
F. Birchall	167	189	138	121	199	180	994
Mrs. R. Hodge	201	135	166	150	206	134	992
O. Goos	164	148	178	189	176	130	985

EGG-LAYING COMPETITION—*continued.*

DETAILS OF SINGLE HEN PENS—*continued.*

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS—*continued*							
I. Fraser	164	185	157	142	146	175	969
Irs. E. White	180	95	195	129	152	190	941
. W. Short	154	151	174	146	153	160	938
hos. Taylor	170	130	167	161	161	144	933
I. F. Newberry	155	130	139	200	136	168	928
. M. Pickering	180	180	109	146	154	138	907
. A. Smith	142	137	160	160	138	149	886
HEAVY BREEDS.							
. Burns	199	203	194	227	202	215	1,240
. E. Walters	176	150	143	178	225	200	1 072
. Hindley	146	172	115	220	218	149	1,020
. C. Dennis	167	172	178	147	168	161	993
. F. Dennis	144	164	189	98	182	195	972
. Holmes	122	188	170	159	158	171	968
I. M. Chaille	159	167	175	134	177	106	918
. Potter	142	149	156	142	157	112	858
Parisian Poultry Farm	96	135	160	108	156	161	816
Rev. A. McAllister	140	160	157	96	76	174	803
. E. Smith	72	113	85	76	98	125	569
Miss L. Hart	81	105	64	105	62	76	493

CUTHBERT POTTS, Principal

ORIGIN OF SUPERPHOSPHATES.

The romance of Lyme Regis and the strange story of how its fossils, from which jewellery was once made, were later turned into superphosphates, was recently (says 'Mark Lane Express'') told by the vicar (the Rev. E. J. Meredith) at the annual dinner of the Yarcombe Agricultural Society. ''When our grandmothers were girls,'' said Mr. Meredith, ''a great trade in jewellery, in the form of brooches and earrings, made largely from fossils, was carried on in Lyme Regis, and about that time the then Dean of Westminster (Dr. Blackburn) paid a visit to the town. The dean, being a very inquisitive man with a scientific turn of mind, saw in Lyme a pretty Devonshire girl and took out her earrings—he must have been very close to her. The ear ornament contained a fossil and it occurred to the learned divine that he had discovered in the fossil something by which he could rejuvenate and revive the face of the earth. Collecting as many of these fossils as he could, the dignitary sent them to a great scientist, who pounded them down and discovered that they consisted of phosphate. A German scientist visited Lyme Regis and, as a result of his investigations, a treatise was written on this fossil manure, and the demand for the fossils was subsequently so great that the jewellery trade in the town soon went down with a bang.''

General Notes.

A Desirable Vacuum.

Thus Sir William Beach Thomas (London "Times") in the current "Australia To-Day":—

The Australian climate—it seems to me the most perfect winter climate that man or woman could desire—is far the better. It is more sunny, less cold, more promotive of fertility, perhaps also of health. You can only grow food in Old England by stoking the soil with manure. Here it is thought much if 40 lb. of superphosphate—a bagatelle—is used per acre of wheat. But Australia produces little if any more grain than the minute British Isles; few if any more cattle, and very many fewer pigs. It is surely a miracle that, almost automatically, the pressure at Home does not force population into this most desirable vacuum.

The Unexpectedness of Australia—A Tribute to Queensland Workers.

Sir William continues:—

The utter unexpectedness of Australia, and indeed its contradiction of established reputation, came over me "in a flood" (like reformation over Henry V.) at Rockhampton, in Queensland, in the course of a journey to the sheep stations of the interior. At Bundaberg (Q.), where I had stopped a day or two, I saw immensely heavy crops of sugar growing in what seemed to me a temperate zone. The cane was being cut by an amazingly athletic group of men who, I fancy, along with fellow-workers on and about this coast, have the distinction of being the only white men in the world engaged in this occupation. Incidentally, it may be worth saying that on these sugar fields, as later in the shearing sheds beyond Blackall (the terminus of the "Turkey Express"), more effective energy was being exercised, per man per minute, than ever I saw before. Newspapers and talkers had succeeded in creating the impression that, generally speaking, work was at a standstill owing to a prevailing habit of going slow, of striking "on the job" or off the job. It was my particular good fortune to see work of a really athletic or gymnastic quality, performances that might quite fitly be compared with the forceful energy of Patterson on the lawn tennis court. It is at least a curious comment on modern civilisation that all the world should talk with admiration of the game-player, and no one at all of the shearer who was keeping up an average of 214 sheep a day. It recalls the comment of the great historian Thucydides, who recorded that the victorious General, Brasidas, was acclaimed by the people "almost as if he were an athlete." What a land Australia would be, even with its tiny handful of men and women, if those reputations of Patterson and the shearer were reversed.

A Departmental Appointment.

Mr. W. Rowlands, formerly fruit packing and grading expert of the Tasmanian Department of Agriculture, has accepted a similar position with the Queensland Government. Mr. Rowlands, in the course of his term of office in Tasmania, did a lot of good work for the fruit industry by teaching growers better methods of preparing their fruit for overseas and interstate markets, and by arranging classes for growers' children at various schools in fruitgrowing centres. Mr. Rowlands was born in Tasmania, and, after watching the various methods used in the different states of Australia, went to New Zealand to supervise the grading and packing of their apples intended for shipment to South America. It was due to his services that New Zealand apples established the name they have in the Argentine. The industry extended from 1,200 cases in 1909 to 50,000 in 1914. Mr. Rowlands was loaned to the Queensland Government last year to demonstrate to growers here better methods of marketing, and a similar request was made this year, but was turned down by the Tasmanian Minister for Agriculture. Subsequently the Queensland Government secured his services for the orchardists of the State. Mr. Rowlands enlisted in New Zealand during the early part of the war, and fought with the New Zealand Mounted Rifles at Gallipoli and was severely wounded during the evacuation.

The Cotton Industry—Special Legislation Foreshadowed.

"Special legislation for the cotton industry is under consideration."

The Minister for Agriculture (Hon. W. N. Gillies) made this statement recently when the presence of so many pests which attacked cotton plants in Queensland was under discussion. Mr. Gillies said that the necessity for immediate action had not been forgotten, and consideration was at present being given to the question of whether something could not be done by means of the regulations under the Diseases in Plants Act.

The question of special legislation dealing with the cotton industry was also under consideration. The special Bill which would be necessary would be designed to foster and protect the industry, and deal with the whole question of ratoon cotton and pests.

Mr. Gillies thought personally that a lot of the pests thrived in dry weather. Fortunately we had not in Queensland a serious menace to the industry such as the boll weevil.

Ratoon Cotton—Ministerial Announcement.

"Now that the cotton-picking season is approaching, I desire to remind those growers who have retained ratoon cotton and wish to obtain the advance promised by the Government this season only, of 3d. a lb. on seed cotton, that certain conditions apply and must be observed," said the Minister for Agriculture (Hon. W. N. Gillies) in the course of a recent departmental announcement. He added that it was imperative that growers of ratoon cotton should advise the manager of the ginnery of the despatch of such cotton and how it was marked to distinguish it from annual cotton. All bags or bales containing ratoon cotton must be marked with the letter "R" at least two inches long. Any grower mixing ratoon with annual cotton or sending ratoon cotton to the ginnery as annual cotton would forfeit any advance, and such cotton would not be ginned.

It must be understood that the advance of 3d. per lb. for ratoon cotton would only be paid for cotton of good quality as understood before the decision for the discontinuance had been made—that was, the cotton must be clean, free from disease, properly packed, and not immature, stained, dirty, or otherwise damaged. Ratoon cotton that reaches a ginnery and did not comply with the foregoing conditions might be rejected, or if accepted, the advances would be less than 3d.

The Minister desired it to be clearly understood that this was the last season during which any consideration whatever could be given to ratoon cotton, and that all ratoon cotton must be ploughed out or otherwise destroyed before next planting time. By the circumstances under which cotton was grown in this State, and from the knowledge of the danger from ratoon plants that had been gained since the advice of those with thorough knowledge of cotton cultivation had been at the service of the department, it was clear that ratooning had been a great mistake from a cultural point of view, as well as owing to the condemnation of the custom by the manufacturers. So clear had the position become that in the opinion of the Minister there was no hope of reopening the question of ratooning, even if, after experiments, no deficiency be found in the breaking strain of ratoon cotton fibre.

Testing Fertilisers—A Palmwoods Pineapple Plot.

Reporting on the pineapple experimental plot which has been established by the Government in the Palmwoods district, Mr. G. Williams (Instructor in Fruit Culture) said:—

"This plot is situated on the farm of Mr. Biggs, of Palmwoods. Conditions were variable and not altogether satisfactory. There was much variation in growth and condition, but the plants included in the higher ground were found most satisfactory. With the exception of one row, odd unhealthy plants were noted in all lines, the percentage increasing towards the lower row, and more particularly

in that part of the area which suggests a hollow or depression, where there is a possibility of soakage after heavy rains. There was not found to be any appreciable difference in the areas treated with sulphur. The effect of application was now very much less pronounced.

"The effect of the last application of fertiliser has not equalled previous applications, in which dried blood was the principal nitrogen. The soil is of a warm nature, made up largely of very fine sand, and the beneficial effect of ammonia sulphate or nitrate of soda would be modified according to weather conditions succeeding their applications, and more particularly as the soil is very deficient in humus. In view of the condition of the plot, experiments will be conducted further, and light applications of fertiliser will be applied during February, followed by a similar quantity in August. The manure to be used will have dried blood in the place of inorganic nitrogen."

Beerburrum Pineapples—Subsidy to Ex-Service Settlers.

In the course of a reply to a deputation of ex-service settlers at Beerburrum recently the Premier (Hon. E. G. Theodore) said it was a matter of surprise to him that the producers concerned in the pineapple industry should be so hesitant or reluctant to co-operate and utilise their combined resources, thus improving their own prices. The matter of the pool had been turned down—certainly not in Beerburrum, as he well knew—but by others, simply because they were a little more favourably placed. Prices would be stabilised with the establishment of a pool and proper operations would prevent under-selling, such as one firm had recently done in the South. The State Government had an obligation to the soldier settler, but on the other hand, it was not a good thing for the settlers to come to the Government and ask for the market to be subsidised. It was quite understandable for one season, but could not continue as a permanent institution. He was prepared to assist them this year to the same extent as last year, that was 1s. per case. It would cost the Government £3,000 out of consolidated revenue, and he was running the gauntlet of Parliament for appropriating money which had not been provided for. In reply to a question he said he took it that it would apply to all soldiers who gave their supplies to the State cannery.

Stanthorpe Tomatoes,

The Minister for State Enterprises (Hon. W. Forgan Smith), who visited Toowoomba and Stanthorpe recently, said, on his return, that the estimated crop under the pool is 250,000 cases. Of that number, about 80,000 cases will be made into tomato pulp at the Stanthorpe factory, and the balance marketed as fresh fruit.

Mr. Smith was accompanied on his trip by the Trade Commissioner (Mr. Austin). The visitors met the Stanthorpe Tomato Pool Board, and also the directors of the Stanthorpe Co-operative Canning Jam and Preserving Company, Limited.

"The State Government," says Mr. Smith, "has agreed to guarantee the bank in connection with the pulping operations to the extent of £8,000, and the agreement between the Treasurer and the Board in this connection was finalised by the Trade Commissioner during our visit. It is anticipated that pulping will commence within the next two weeks."

The Minister declared that the Stanthorpe tomato pulp bore a very good reputation amongst the canners generally, and no difficulty was anticipated in disposing of the whole of the pulp product at a satisfactory price. As regarded fresh tomatoes, marketing was proceeding very satisfactorily.

"From the whole of the Pool operations," he added, "it is estimated that upwards of £50,000 will be realised from the sale of the tomatoes."

Mr. Smith took the opportunity of visiting the Pikedale Soldiers' Settlement, and with the supervisor he was pleased to be able to meet a number of the growers and discuss matters personally with them. He formed a favourable impression of those settlers and from inquiries made he felt satisfied that the settlement would

eventually be a success. There was no doubt about the capabilities of the soil and the men and women who have set out to make a living there. The whole question was one of efficient marketing of the products in the interests of both producer and consumer.

Export of Apples—Interesting Experiments.

For some time the British Food Investigation Board has been carrying out experiments on various problems connected with the cold storage of apples, and it is expected that the results will be of considerable value to Australian exporters of that fruit. As regards temperatures, the conclusions arrived at are:—(*a*) that 1 degree C. is the most suitable temperature at which to store apples, and (*b*) that there is a critical point in the temperature at about 3 degrees C., below which loss is almost wholly confined to diseases due to physical surroundings and not to infection, whilst above the critical temperature loss is almost entirely due to infection by moulds.

Very valuable results have been obtained by storing apples in an atmosphere containing (*a*) from 5 per cent. of oxygen (as compared with 21 per cent. in normal air), and (*b*) from 12 to 15 per cent. carbon dioxide (as compared with minute traces in normal air). The success of this "gas" storage method depends on the automatic control of humidity and the circulation of the gas.

The Director of the Institute of Science and Industry (Mr. G. H. Knibbs) has received information from England that the Food Investigation Board has organised a small expedition of three highly qualified scientific men which will make the voyage to Australia and back for the purpose of investigating the conditions of transport of apples overseas, and testing different types of instruments for the registration of the temperature, humidity, and carbonic acid contents of the hold. The expedition is travelling by the steamer Moreton Bay, due at Fremantle on 2nd February.

Referring to the matter, Mr. Knibbs said recently that the Food Investigation Board had made a special study of the fungal and physiological diseases of apples in store, with results which are of both scientific and practical interest. Special attention was paid to "scald." This appears to be a physiological disease, the liability of which is intensified by too early gathering of the fruit. Fungal diseases appear to be due to spores present on the surface of the apple at the time of storage. The nature and extent of the "rots," therefore, is determined to a large extent by conditions in the orchard and to infection in the packing shed. The chief source of loss appeared to be due to the latter; therefore, sanitary conditions of handling and the possibility of disinfecting the fruit

A Destructive Beetle.

Recently specimens of a tiny flying beetle, which had been discovered preying on cotton plants in the Beenleigh district, were submitted to the Government Entomologist (Mr. Henry Tryon) for identification. Two farmers in the yellowwood belt of the Beenleigh territory have reported considerable damage to their cotton crops by this insect. The case of one of them is typical, and may be cited. Mr. A. Brauer planted an experimental area of land with Egyptian seed last October. It came up very strongly, and advanced as high as 3 feet, until this leaf-eating beetle made its appearance. They worked from plant to plant in thousands, ate the leaf, also the blossoms, and even the bark off the boll, until there is none left; then the boll burst open, with the result that there is no cotton. Mr. Brauer tried to check them in every way. He lit fires to smoke them out, also tried arsenate of lead (1 lb. to 50 gallons of water), which did no good; and a stronger solution killed the plants. Mr. Brauer had the same beetle attack the blossoms on his fruit trees in a previous year. Mr. Berndt is the other farmer. He also has the beetles in his cotton taking everything before them; three years ago he had the same beetle in his lucerne crop. When it was mowed it had such a strong smell that the stock would not eat it.

Mr. Tryon at once identified the beetles, and declared them to be affecting a very large area of Queensland. In the course of his report Mr. Tryon said the insects

submitted to him are examples of a beetle named *Mono-Lepta rosea*—one that has already been met with this season in injurious relationship to cotton, from the Rockhampton area southwards almost to the border. Moreover, it is not only a depredator of cotton, but damages many other plants quite unrelated to it—*e.g.*, maize, mango (blossoms), grape (young fruit), plum (young fruit), orange, peach, rose, mulberry, and even dahlias. It also occurs on many native plants. The fact of lucerne being one of its food plants was, however, new to him.

It apparently lays its eggs in the soil, and there are some reasons for concluding that in grass lands amongst other places. However, the life history of the insect, which presents some technical difficulties in unravelling, has not been fully elucidated. Each female may deposit about fifty eggs about ¼ millimetre in length (H. Jarvis). And there are at least two broods here during the summer months.

This prolificness of the insect, and the fact that it is somewhat gregarious in its habits, accounts for the enormous numbers—with corresponding damage to plant life—that characterises its presence.

It may be killed by spraying with an arsenic containing compound—*e.g.*, Paris green or arsenate of lead, or either of these administered in a dry form. However, this involves consuming some leaf-tissue, and as fresh comers readily replace those that have succumbed, much foliage destruction may still result, so that little if any control in its ravages is exercised.

Even dense smoke only operates in banishing the insects from any spot, temporarily, since they are wont to repair to their former feeding grounds as soon as the smoke clears.

As was discovered some years since by Mr. Lamont, of Taringa, the *Mono-Lepta rosea* is attracted to light, and may be lured to its destruction. The employment of light suggests the use of a special trap; but the description of the procedure in making one of these light traps cannot be entered upon on this occasion, and the apparati are not obtainable by purchase here at present.

An ordinary bright fire, or fires, in the field, as has already been demonstrated in the Rockhampton area, has proved the best procedure so far devised for its destruction, but one is loath to recommend resort to its use generally, as unless great care be exercised the risk of setting alight to the crop, too often grown amidst weeds, is one not to be ignored, especially where several of these fires have to be attended to.

Cotton Pests—Entomologist's Report.

Recently some insect-damaged cotton plants, together with specimens of the predatory insects, came to this Office from Mr. J. Bell, of Pine Mountain. The Government Entomologist and Vegetable Pathologist (Mr. Henry Tryon), after examination of the specimens, reported as follows:—

The principal insect implicated is the caterpillar of a small moth, a species of Earias, probably *E. Huegeli*, that is not an uncommon pest of our cotton fields. This not only feeds on the pith of the young green wood, especially at the base of the shoots, but, when a second generation is taking place, mines into the developing bolls and both penetrates the seed and cuts through the developing lint. The moth itself measures about 1½ inches across the wings, the front pair of which are creamy-white with a brown band of green down their centres. It lays its eggs singly amidst the tender growth of its host plant, and the caterpillars hatching therefrom soon gnaw inwards into its soft tissue, and, feeding voraciously, arrive at full growth in about two weeks. These caterpillars are pale-green, conspicuously mottled with brown in patches, and are remarkable in possessing series of boss-like projections along their bodies, each terminating in a long bristle. This feature has led to the Earias caterpillar being termed the spiky or spiney cotton boll worm.

The nature of injury experienced by the young cotton plant from its attacks is thus described by Mr. W. A. T. Summerville: "The plants were about two months old and 1 foot 6 inches high. The field was damaged to the extent of about 3 per cent. The injured plants showed the younger growth and lateral shoots wilted, withered, and crumpled up, or even dead and darkened, and the young buds and shoots heavily falling off. On examining these more closely, it was noticed that the main stems were gnawn into and tunnelled through. Also that two kinds of caterpillars were present, one a mottled brown insect with blunt spines along its body, and the other a smaller smooth-bodied creature."

The caterpillar described as that of *Earias Huegeli* spins a peculiar close-woven, smooth brown cocoon, with steep sides, and projects to a point above—at one end. This is fastened low down upon the stem of the cotton plants or even on lumps of soil, the caterpillar making its exit from its food plant before fabricating it. Changing to a chrysalis within this, the insect, after about ten days or a fortnight since this metamorphosis has taken place, emerges as a moth. This injurious insect has at least two broods during the summer months in Southern Queensland, possibly three broods.

The second insect mentioned—"the smaller smooth-bodied caterpillar"—has not been so far identified, but there are some grounds for concluding that it is a scavenger named Pyroderces, which elsewhere frequents the parts of the cotton injured by the "spiny boll worm," and is represented in Queensland by an indigenous species.

The boll worm that is now being considered is best controlled by the systematic examination of the affected cotton patch, when the earliest symptoms of injury are being manifested, and then cutting out the affected shoots. (Note.—At the time the occurrence was noticed, it was already too late to do this with effect.) Later on, when the first crop has been harvested, the plants as a whole should be taken and burnt, and the ground ploughed, so as to bury any chrysalises and the cocoons harbouring them, that may occur from any earth clods or smaller objects that may occupy the soil surface. Probably in Queensland, as occurs also in India and Egypt, where species of this Earias cotton boll worm are met with, the plant depredator under notice is held in check to some extent by parasites that are especially operative against it when associated with one or other of the native plants whence the cotton has received it as a harmful insect.

Natural Enemies of Sugar-Cane Beetles in Queensland.

Supplementing the Sugar Notes in this issue is a series of coloured plates depicting some of the natural enemies of sugar-cane beetles in Queensland. These illustrations are taken from *Bulletin No.* 13 *of the Division of Entomology, Bureau of Sugar Experiment Stations, Queensland* (Dr. J. F. Illingworth), 1921. We are indebted to the Director of Sugar Experiment Stations (Mr. H. T. Easterby) and the delineator (Mr. Edmund Jarvis, Entomologist, Bureau of Sugar Experiment Stations, North Queensland), for permission to reproduce them in the Journal.

Answers to Correspondents.

"Roup (or Worms) of the Eye in Poultry."

J.W.M. (Mareeba)—

The Poultry Instructor (Mr. J. Beard) advises equal parts of tinct. of aloes and water. Instil a few drops three times daily. After three or four days the worms become absorbed. Or try—

One part argyrol in ten parts water. Instil a few drops once a day, and you will get the same results as above.

From my own experience, I find the following, if carried out properly, a sure thing:—As soon as you notice the inner membrane partly covering the eye get the bird and place the head on your knee and hold it firm, then place your thumb or index finger well back behind the eye, use pressure and work gradually forward and you will notice the worms appear in a bunch. Get them away and burn them, clean the eye well, then apply a few drops of kerosene, and they won't appear again if done properly. Don't neglect them until the cheesey matter adheres to the eye, and then expect to effect a cure. Attend to it in its first stages, and you may stamp it out altogether. Let me know results.

The Government Entomologist (Mr. H. Tryon) replies to queries as follows:—

White Ants.

Personally, I have concluded from my observations that in the cases of termites or white ants occurring in a house, and their access to the soil being prevented, they would succumb after not many days. To assure myself that this was what really happened under those circumstances, I consulted Mr. W. Street, whose knowledge of the habits of our South Queensland white ants is quite exceptional. He informed me then that these insects on their means of access being quite cut off die when isolated in houses, within six or eight days, but that the presence of a nest or "termitarium" within the house, and still intact, might make a slight difference in this respect. Should they continue to live after this period, the possibility of their still possessing some road by which they were reaching the soil might be anticipated. The existence of this, however, would be indicated by their manifesting their usual active habits when disturbed. The change in demeanour on their part—a sluggishness and inertness (taking the place of this) would, on the other hand, whilst as yet they were not dead, be a sign, especially to the trained eye, that their death would soon be realised. I should like to receive specimens, including the soldiers of the white ants that your correspondent has in his dwelling. They may belong to a species distinct from any one of those whose habits I have in view.

Beetle *(Isodon puncticalle)* Attacking Asters.

The insects submitted as possibly damaging the parts of the aster plants beneath the soil surface are undoubtedly capable of inflicting injury through gnawing the stem-axis or in larger roots arising from it. They are the adults of a rather common beetle named Isodon puncticalle, and the aster is not alone in being the victim of their depredations. Although met with beneath the surface it is only during the day that they effect a subterranean abode. With regard to remedial measures this small brown beetle is rather difficult to cope with. It was formerly anticipated that as they are to a slight extent attracted by light, they could be captured by trap-lanthorns. However, experiments in which these have been used (a lamp suspended over a shallow dish of water having a film of kerosene on it) have given very poor positive results. Apparently, manure used in dressing the soil either before or after planting seems—by attracting the beetles with the odour it disseminates—to be to some extent responsible for their presence in numbers. Should this invariably be the case the use of a body whose odour would tend to mask that of the fertiliser might be indicated, especially one containing crude naphthalene (moth ball). Such a body we have in "vaporite" stocked by Messrs. Webster and Co. The use of this body for the purpose in view could then be assayed.

Farm Notes for March.

Land on which it is intended to plant winter cereals should be in a forward stage of preparation. Sowings of lucerne may be made at the latter end of the month on land which is free from weed growth and has been previously well prepared.

The March-April planting season has much in its favour, not the least of which is that the young weeds will not make such vigorous growth during the next few months, and, as a consequence, the young lucerne plants will have an excellent opportunity of becoming well established.

Potato crops should be showing above ground, and should be well cultivated to keep the surface soil in good condition; also to destroy any weed growth.

In districts where blight has previously existed, or where there is the slightest possible chance of its appearing, preventive methods should be adopted—*i.e.*, spraying with "Burgundy mixture"—when the plants are a few inches high and have formed the leaves; to be followed by a second, and, if necessary, a third spraying before the flowering stage is reached.

Maize crops which have fully ripened should be picked as soon as possible and the ears stored in well-ventilated corn cribs, or barns. Weevils are usually very prevalent in the field at this time of the year and do considerable damage to the grain when in the husk.

The following crops for pig feed may be sown:—Mangel, sugar beet, turnips and swedes, rape, field cabbage, and carrots. Owing to the small nature of the seeds, the land should be worked up to a fine tilth before planting, and should contain ample moisture in the surface soil to ensure a good germination. Particular attention should be paid to all weed growth during the early stages of growth of the young plants.

As regular supplies of succulent fodder are essentials of success in all dairying operations, consideration should be given to a definite cropping system throughout the autumn and winter, and to the preparation and manuring of the land well in advance of the periods allotted for the successive sowings of seed.

The early planted cotton crops should be now ready for picking. This should not be done while there is any moisture on the bolls, either from showers or dew. Packed cotton showing any trace of dampness should be exposed to the sun for a few hours on tarpaulins, bag or hessian sheets, before storage in bulk or bagging or baling for ginning. Sowings of prairie grass and *phalaris bulbosa* (Toowoomba canary grass) may be made this month. Both are excellent winter grasses. Prairie grass does particularly well on scrub soil.

Dairymen who have maize crops which were too far advanced to benefit by the recent rains, and which show no promise of returning satisfactory yields of grain, would be well advised to convert these into ensilage to be used for winter feed. This, especially when fed in conjunction with lucerne or cowpea, is a valuable fodder. Where crops of sudan grass, sorghum, white panicum, Japanese millet, and liberty millet have reach a suitable stage for converting into ensilage, it will be found that this method of conserving them has much to recommend it. Stacking with a framework of poles, and well weighting the fodder, is necessary for best results. All stacks should be protected from rain by topping off with a good covering of bush hay built to a full eave and held in position by means of weighted wires.

Orchard Notes for March.

THE COASTAL DISTRICTS.

As soon as the weather is favourable, all orchards, plantations, and vineyards that have been allowed to get somewhat out of hand during the rainy season should be cleaned up, and the ground brought into a good state of tilth so as to enable it to retain the necessary moisture for the proper development of trees or plants. As the wet season is frequently followed by dry autumn weather, this attention is important.

Banana plantations must be kept free from weeds, and suckering must be rigorously carried out, as there is no greater cause of injury to a banana plantation than neglect to cultivate. Good strong suckers will give good bunches of good fruit, whereas a lot of weedy overcrowded suckers will only give small bunches of undersized fruit that is hard to dispose of, even at a low price.

The cooler weather will tend to improve the carrying qualities of the fruit, but care must still be taken to see that it is not allowed to become overdeveloped before it is packed, otherwise it may arrive at its destination in an overripe and, consequently, unsaleable condition. The greatest care should be taken in grading and packing fruit. Only one size of fruit of even quality should be packed. Smaller or inferior fruit should never be packed with good large fruit, but should always be packed separately.

The marketing of the main crop of pineapples, both for canning and the fresh fruit trade, will be completed in the course of the month, and as soon as the fruit is disposed of, plantations which are apt to become somewhat dirty during the gathering of the crop must be cleaned up. All weeds must be destroyed, and if blady grass has got hold anywhere it must be eradicated, even though a number of pineapple plants have to be sacrificed, for once a plantation becomes infested with this weed it takes possession and soon kills the crop. In addition to destroying all weed growth, the land should be well worked and brought into a state of thorough tilth.

In the Central and Northern districts, early varieties of the main crop of citrus fruits will ripen towards the end of the month. They will not be fully coloured, but they can be marketed as soon as they have developed sufficient sugar to be palatable; they should not be gathered whilst still sour and green. Citrus fruits of all kinds require the most careful handling, as a bruised fruit is a spoilt fruit, and is very liable to speck or rot. The fungus that causes specking cannot injure any fruit unless the skin is first injured. Fruit with perfect skin will eventually shrivel, but will not speck. Specking or blue mould can therefore be guarded against by the exercise of great care in handling and packing. At the same time, some fruit is always liable to become injured, either by mechanical means, such as thorn pricks, wind action, hail, punctures by sucking insects, fruit flies, the spotted peach moth, or gnawing insects injuring the skin. Any one of these injuries makes it easy for the spores of the fungus to enter the fruit and germinate. All such fruit must therefore be gathered and destroyed, and so minimise the risk of infection. When specky fruit is allowed to lie about in the orchard or to hang on the trees, or when it is left in the packing sheds, it is a constant source of danger, as millions of spores are produced by it. These spores are carried by the wind in every direction, and are ready to establish themselves whenever they come in contact with any fruit into which they can penetrate. Specking is accountable for a large percentage of loss frequently experienced in sending citrus fruits to the Southern States, especially early in the season, and as it can be largely prevented by the exercise of the necessary care and attention, growers are urged not to neglect these important measures.

Fruit must be carefully graded for size and colour, and only one size of fruit of one quality should be packed in one case. The flat bushel-case (long packer) commonly used for citrus fruits, does not lend itself to up-to-date methods of grading and packing, and we have yet to find a better case than the American orange case recommended by the writer when he came to this country from California in 1892,

and which again proved its superiority in the recent shipment of oranges from South Australia to England. Failing this case, a bushel-case suggested by the New South Wales Department of Agriculture is, in the writer's opinion, the most suitable for citrus fruits, and were it adopted it would be a simple matter to standardise the grades of our citrus fruit, as has been done in respect to apples packed in the standard bushel-case used generally for apples throughout the Commonwealth. The inside measurements of the case suggested are 18 in. long, 11¾ in. wide, and 10½ in. deep. No matter which case is used, the fruit must be sweated for seven days before it is sent to the southern markets, in order to determine what fruit has been attacked by fruit-fly, and also to enable bruised or injured fruit liable to speck to be removed prior to despatch.

Fruit-fly must be systematically fought in all orchards, for if this important work is neglected there is always a very great risk of this pest causing serious loss to citrus growers.

The spotted peach-moth frequently causes serious loss, especially in the case of navels. It can be treated in a similar manner to the codlin moth of pip fruit, by spraying with arsenate of lead, but an even better remedy is not to grow any corn or other crop that harbours this pest in or near the orchard. Large sucking-moths also damage the ripening fruit. They are easily attracted by very ripe bananas or by a water-melon cut in pieces, and can be caught or destroyed by a flare or torch when feeding on these trap fruits. If this method of destruction is followed up for a few nights, the moth will soon be thinned out.

Strawberry planting can be continued during the month, and the advice given in last month's notes still holds good. Remember that no crop gives a better return for extra care and attention in the preparation of the land and for generous manuring than the strawberry.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

The advice given in these notes for the last few months regarding the handling, grading, and packing of fruit should still be carefully followed. The later varieties of apples and other fruits are much better keepers than earlier-ripening sorts, and as they can be sent to comparatively distant markets, the necessity for very careful grading and packing is, if anything, greater than it is in the case of fruit sent to nearby markets for immediate consumption. Instruction in the most up-to-date methods of grading and packing fruit has been given in the Granite Belt area in the course of the present season by Mr. Rowlands, the Tasmanian Fruit Packing Expert, whose services the Queensland Government have been fortunate in securing, and whose practical advice and instruction should enable the growers in that district to market their produce in a much more attractive form.

The same care is necessary in the packing of grapes, and it is pleasing to note that some growers are packing their fruit very well. Those who are not so expert cannot do better than follow the methods of the most successful packers.

Parrots are frequently very troublesome in the orchards at this time of the year, especially if there is a shortage of their natural food. So far, there is no very satisfactory method of combating them, as they are very difficult to scare, and, though shooting reduces their numbers considerably, they are so numerous that it is only a subsidiary means.

As soon as the crop of fruit has been disposed of, the orchard should be cleaned up, and the land worked. If this is done, many of the fruit-fly pupæ that are in the soil will be exposed to destruction in large numbers by birds, or by ants and other insects. If the ground is not worked and is covered with weed growth, there is little chance of the pupæ being destroyed.

Where citrus trees show signs of requiring water, they should be given an irrigation during the month, but if the fruit is well developed and approaching the ripening state, it is not advisable to do more than keep the ground in a thorough state of tilth, unless the trees are suffering badly, as too much water is apt to produce a large, puffy fruit of poor quality and a bad shipper. A light irrigation is therefore all that is necessary in this case, especially if the orchard has been given the attention recommended in these notes from month to month.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1923.	JANUARY.		FEBRUARY.		MARCH.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	5·1	6·49	5 25	6·46	5·45	6·24
2	5·2	6·50	5·26	6·46	5·46	6·23
3	5·3	6·50	5·27	6·45	5·47	6·22
4	5·3	6·50	5·28	6·44	5·47	6·21
5	5·4	6·50	5·29	6·43	5·48	6·20
6	5·5	6·51	5·30	6·43	5·48	6·19
7	5·5	6·51	5·30	6·42	5·49	6·17
8	5·6	6·51	5 31	6 41	5·49	6·16
9	5·6	6·51	5·32	6 40	5·50	6·15
10	5·7	6·51	5·33	6·39	5·50	6 14
11	5·8	6·51	5 33	6·39	5·51	6·13
12	5·9	6·51	5·34	6·38	5·51	6·12
13	5·10	6·51	5·35	6·38	5·52	6·11
14	5·11	6·51	5·36	6·37	5·53	6·10
15	5·12	6·51	5·36	6·36	5·54	6·9
16	5·12	6·51	5·37	6·35	5·54	6·7
17	5·13	6·51	5·38	6·35	5·55	6·6
18	5·14	6·50	5·38	6·34	5·56	6·5
19	5·15	6·50	5·39	6·33	5·56	6·4
20	5·16	6·50	5·40	6·32	5·57	6·3
21	5·16	6·50	5·40	6·32	5·57	6·2
22	5·17	6 50	5·41	6·31	5·58	6 0
23	5·18	6·49	5·41	6·30	5·58	5·59
24	5·19	6·49	5·42	6·29	5·59	5·58
25	5·20	6·49	5·42	6·28	5·59	5·57
26	5·20	6·48	5·43	6·27	6 0	5·56
27	5·21	6·48	5·44	6·26	6 0	5·55
28	5·22	6·47	5·45	6·25	6 1	5·53
29	5·23	6·47	...	...	6·1	5·52
30	5·24	6·46	...	...	6·2	5·51
31	5·25	6·46	...	...	6·2	5·50

PHASES OF THE MOON, ECLIPSES, OCCULTATIONS, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania when "Summer" Time is not used.

3 Jan.	○	Full Moon	12 33 p.m.
10 „	☽	Last Quarter	10 55 a.m.
17 „	●	New Moon	12 41 p.m.
25 „	☾	First Quarter	1 59 p.m.

Perigee on 8th at 9.54 p.m.
Apogee on 23rd at 11.24 p.m.

On 3rd January at 9 a.m. the Earth will be in perihelion, its least distance from the Sun about 91,300,000 miles. Three days later Venus will be in perihelion, and will be about 17,000,000 miles further from the Earth than it was on 25th November when in perigee.

On 29th January Mercury will be passing to the west of the Sun about 4 degrees on its northern side.

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2 Feb.	○	Full Moon	1 53 a.m.
8 „	☽	Last Quarter	7 16 p.m.
16 „	●	New Moon	5 7 a.m.
24 „	☾	First Quarter	10 6 a.m.

Perigee on 4th at 5.18 p.m.
Apogee on 20th at 6.18 p.m.

On 4th February Venus, apparently on the western border of Sagittarius, will be at its greatest western elongation, about 47 degrees from the Sun. On the 6th, soon after sunset, Saturn will be occulted by the Moon when below the horizon, but about four hours later the Moon, Saturn, and Spica will be apparently near to one another low down in the east.

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3 Mar.	○	Full Moon	1 24 p.m.
10 „	☽	Last Quarter	4 31 a.m.
17 „	●	New Moon	10 51 p.m
26 „	☾	First Quarter	2 42 a.m.

Perigee on 4th at 8.48 p.m.
Apogee on 20th at 6.24 a.m.

The Moon will be partly eclipsed on the afternoon of 3rd March, and there will be an annular eclipse of the Sun on the 17th, but neither will be visible in Australia.

Saturn will be occulted by the Moon about 2 a.m. on 6th March, when apparently near to the bright star Spica in the constellation Virgo. This fine combination of celestial objects will be then high up in the sky, nearly overhead.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter, and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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QUEENSLAND AGRICULTURAL JOURNAL

VOL. XIX. MARCH, 1923. PART 3.

Event and Comment.

The Current Issue.

Readers should find the current Journal a most interesting one. Foremost among the special articles is the first of a series on agricultural organisation, covering an account of American co-operative associations and a comparison of them with the Queensland Producers' Association, written from on-the-spot studies by Mr. J. D. Story, who visited California recently on behalf of the Queensland Government. Cotton-growing is served with comprehensive and seasonable matter. As our greatest agricultural interest sugar is, as usual, well covered. Mr. Easterby contributes a timely comment on the industry, and Mr. Edmund Jarvis's science notes are particularly interesting. The first instalment of a special series on fertilisers and manures is very informative, and is designed as a source of material for a course of lectures to farmers to be inaugurated shortly. A review of a year's activities in the Stock Division and the Pure Seeds and Stock Foods Section throws a strong light on the doings of industrious and little-advertised branches of the Department. "Stud Stock Studies" is a new illustrated feature designed to present pictorially types of leading dairy cattle breeds with the object of, in a measure, stimulating and maintaining interest in dairy herd improvement. Illustrated notes on Queensland trees and weeds are also, among numerous other matters, of current importance.

Economic Education and Commonsense Co-operation.

Agriculture is the first industry in the State—as a fact, it is the first industry of any country—and its prosperity has the greatest direct and indirect influence upon conditions affecting the national welfare. It is the industry that deals with the most valuable, the most lasting, and at the same time the most elastic of our material resources—the fertility of the soil. It is the industry that naturally appeals to all of us, for most of our national traditions are rooted in the soil. And yet in spite of its strong appeal to natural industrial instincts, and its strong hold upon the traditional imagination of the people it is so sorely beset with difficulties that land settlement has grown into a problem, and the retention of pioneer settlers on their holdings a problem just as great. The economic weakness of the agricultural industry is one of the great causes of urban congestion and rural declension. What the industry insistently calls for is the marking and traversing of the right economic path, fresh application of science, bolder initiative, and effective education —the sort of education that gives not only technical knowledge, but the mental equipment that enables men to respond with a quick intelligence when new ideas of value are placed before them, and to reject those that are merely plausible; the sort of education that gives a greater insight into the economic forces that affect

their industry, the delicacy and intricacy of modern commercial machinery, and a broader outlook over the field of industrial opportunity. True co-operation as applied to the agricultural industry has never yet been properly tried out; it has never yet really had an open chance. There have, it is true, been many significant individual successes—successes, however, balanced by some significant failures. The great desideratum is State-wide commonsense co-operation on broad plain ordinary horse-sense lines, and in the Queensland Producers' Association Queensland farmers have now a lever for, and a great opportunity of, placing their industry in the position of natural and national pre-eminence that it should rightly occupy.

The Sugar Industry.

One of the outstanding events of the month was the visit of the Queensland Sugar Delegation to Melbourne to place before the Prime Minister the facts affecting the contemplated alteration of conditions governing the economic side of the sugar industry. The Minister for Agriculture and Stock (Hon. W. N. Gillies) led the delegation and pressed for a renewal of the Federal agreement under which the industry had become to a large extent stabilised. His task was a difficult one for Southern hostile influence, based on ignorance of facts, failure to outgrow erroneous opinions formed and policies advocated in pre-Federal days, and Press prejudice sedulously cultivated, opposed bitterly the continuance of the present sugar agreement. Mr. Gillies expressed surprise that there are Australians to-day who have not yet realised that the doctrine of "White Australia" has passed from an ideal to an actuality through the agency of the Queensland sugar industry, that both the kanaka and large plantations have long since disappeared, and that in their stead are small farms owned and worked almost exclusively by men of their own colour, race, and ideals. The industry to-day, re-emphasised Mr. Gillies, had become the greatest bulwark of our national safety. Australia is the one country in the world to-day that grows sugar-cane successfully and manufactures it into sugar by white labour and under white labour conditions. Queensland has hundreds of thousands of acres of land with a climate and rainfall suitable for sugar-growing equal to that in any part of the world. Other points in favour of renewal of the agreement or adoption of the submitted tariff alternative were stressed strongly by other members of the delegation, who represented directly every section of the sugar industry. The Prime Minister, in the course of his reply, said that the Federal Government realised fully the value of the industry both economically and nationally; he held out no hope for the renewal of the agreement, but promised that the industry would be safeguarded fiscally.

Fighting Drought.

The Council of Agriculture has submitted to the Government a comprehensive scheme of fodder conservation with a view to the preservation of dairy herds during prolonged dry spells. The scheme is regarded as the overture in a complete anti-drought campaign designed to protect all agricultural and pastoral activities in lean years.

Central Dumps Favoured.

The Council is of opinion that storage of baled lucerne hay and the production of ensilage will be found to be satisfactory methods of fodder conservation. Provision for the latter would have to be made on farmers' holdings, while in the matter of storage of lucerne hay the Council is of opinion that it would be necessary to provide for central storage dumps at railway sidings and other central points to provide for important settlements located some distance from railway lines. Although lucerne hay can be held with much greater safety than some other fodders, and is indeed good security for an advance, it might also be found practicable to conserve other fodder such as wheaten or oaten chaff in bulk, cereals, and so on, and in any Act of Parliament establishing the scheme, power should be given to the controlling body to undertake such conservation, if deemed advisable. While the Council strongly favours the storage by farmers of reserves of hay on their own holdings, it advises against embracing within a comprehensive fodder conservation scheme any provisions covering the storage of hay on farms. It is felt that the matter of advances to encourage the storage of hay on farms is the proper sphere of private financial institutions, or of a rural credit system if established. Even for such bodies as these, the security for advances specifically to enable farmers to hold hay on farms would not be a good one, and inspection to ascertain the quantity on which the advance should be made, and to provide for adequate protection of the security, would be extremely costly.

The Question of Finance.

The Council has considered four methods of financing the scheme, namely:—

(*a*) Power to the controlling body to issue bonds (or debentures) to the public.

(*b*) A fodder pool to be constituted, the producers retaining an interest in the fodder getting a small advance at time of delivery and participating in final distribution.

(*c*) Offer of debentures for sale to producers likely to use fodder with or without Government subsidy.

(*d*) Capitalisation of fodder conservation scheme by the Government or of loan funds.

The Council is of opinion that the method under (*b*) above is not advsiable. This is further commented upon in clause 15 hereof.

Method under (*c*) is deemed entirely impracticable.

The Council favours the methods under (*a*) and (*d*).

The total finance required to carry out a scheme of the magnitude herein suggested would probably reach the figure of 3½ million pounds sterling. This would not all be required at the outset, but should be gradually made available as storage proceeds. Probably an average of £700,000 per annum for the first five years would enable the objective to be attained. This may at first sight seem an inordinately large expenditure, but when regard is had to the immense losses entailed by calamitous droughts, it is believed that even opponents of such a scheme cannot but concede the proposals to be a sound business proposition.

Strictly Cash Basis.

It is strongly urged that no fodder should be sold except for cash. If relief be essential in necessitous cases under drought conditions, the private financial institutions, State Advances Corporation, or a system of rural credit should place the farmer in a position to purchase fodder from the Fodder Conservation Board for cash. If any other system be followed, there would be a tendency for the Fodder Conservation Board to find its capital locked up in debts due by sundry debtors, thereby making it impossible for the board to repurchase stocks following upon depletion. If care be not exercised there is a danger of the Fodder Conservation Board becoming an ordinary banking institution, and the essential of fodder conservation would tend to be lost sight of.

Suggested Conservation Board.

The Council recommends that the business of fodder conservation be undertaken by a body to be designated the Fodder Conservation Board, and that the capital provided be vested in the board as trustees of the fund. A special Act of Parliament would be necessary governing the operations of the scheme. The Council recommend that all members of this board be appointed by the Government and suggests that in the constitution of such boards provision be made for not fewer than two out of five or three out of seven being *bonâ fide* primary producers.

It is recommended that all matters affecting advances for the purpose of building silos on farms be transferred from Government Departments at present undertaking that service to the Fodder Conservation Board, as the latter body would be concentrating upon all aspects of fodder conservation.

The Council is of opinion that at the inception of the scheme hay for storage should be purchased straight out by the Fodder Conservation Board. It is of opinion that the retention by the deliverer of the hay of any interest in the hay delivered is not advisable. The price paid should be such as to remunerate the producer, and to enable the Fodder Conservation Board to become sole owner of the fodder they control.

Question of Mortgages.

It is pointed out that many farms, on which silos should be constructed, are already mortgaged to banks, private institutions, or to the State Advances Corporation, and some difficulty attaches to the matter of providing good security. This, it is thought, however, may be afforded by one of the following methods, namely:—

(*a*) Legislative enactment, providing that advances for silos shall have priority over all other encumbrances.

(*b*) Enactment, providing that the land on which silos are constructed, with right of access, shall be transferred to the Fodder Conservation Board.

(*c*) Equal rights in *pari passu,* with existing mortgage, or

(*d*) Second mortgage.

The method under item (*c*) is favoured by the Council, on the ground that the institution of a fodder conservation scheme would extensively buttress the security of existing mortgagees, and as the amounts advanced for silos would not be large, existing securities would be improved rather than prejudiced.

ORGANISATION OF THE AGRICULTURAL INDUSTRY IN QUEENSLAND—I.

By J. D. STORY, Chairman Administrative Committee, Council of Agriculture, and J. F. F. REID, Editor of Publications, Department of Agriculture and Stock.

This is the first of a series of articles, prepared especially for the Journal, crystallising the results of investigations and studies of Californian methods of Agricultural Organisation, Administration, and Education. In this instalment the American system is described and compared with the plan of the Queensland Producers' Association—the outcome of the great agricultural advance of last year and the movement towards stabilised rural industry, which is gathering momentum every week in this State.—Ed.

Queensland is very largely dependent for her national existence upon her primary industries. She is desirous of filling her empty spaces and of establishing a vigorous and reasonably contented rural population. In that direction lies national safety and national prosperity. To accomplish that end farming must be made worth while; producers must receive a fair return for their labour; the country must be made as attractive in its way as the town; the lot of country women must be improved; the child of the country must be given the same advantages as the child of the city. When the prosperity of the producer is increased appreciably much will have been done to secure those objects, and three of the factors which will contribute mainly towards that prosperity are good seasons, suitable agricultural education and instruction, and efficient organisation.

Man does not control the seasons, but there is much which man can do to protect himself from the effects of adverse seasons. Experience, education, instruction, and organisation will help him. The experience he will gain for himself and through others. The Department of Agriculture provides instruction through the visits, demonstrations, and bulletins of its officers. As that instruction means so much to the farmer, it is obvious that the instruction should be sound; it is further obvious that if the instruction is to be sound it is essential that only qualified men should be appointed, and if the juniors of to-day are to become the seniors of to-morrow, those juniors must be trained efficiently. Hence the Queensland University should assist in the matter of research and of higher agricultural education.

"The Primary Producers' Organisation Act of 1922" has been passed by Parliament to provide for a unified organisation of the primary producers of Queensland, and the two cardinal principles of that organisation are to be—"Home Rule," namely, control by the producer for the producer—and "Co-operation." In regard to both instruction and experience organisation can be of great or little assistance according to the support which its members are prepared to give it. The Queensland Council of Agriculture is already trying to assist producers by the formulation of schemes for dealing with urgent and vital problems.

So far, the operations of the Q.P.A. have been directed by a provisional council representative of the various sections of the agricultural industry. Reports of the activities of the association have appeared from time to time in the Press, and those activities need no comment here. The L.P.A.s have been formed, the district councils have been elected, and the new Council of Agriculture will shortly be constituted; the time is therefore opportune to consider what precisely are the functions which each section of the organisation will discharge.

THE AMERICAN SYSTEM.

As a guide, a review of the American Farm Bureau and Farm Adviser movement may be interesting and helpful.

The Move Towards Rural Stabilisation.

Farm bureaux are a natural growth of the desire of the American farmers to do two things—first, to unite for mutual self-help and co-operation along any line that may be needed, and second, to get into close touch with those institutions of public enterprise and of government which have accumulated the information necessary to make farm life prosperous. The farm bureaux have no other function than to aid the development of rural life which, in turn, is the greatest stabiliser of national existence.

At various stages of the development of American agriculture many types of farmers' organisations have been brought into existence. Some have been successful; many have failed. That failure has usually been due to one or more causes—lack of a distinct purpose to fill a definite need, lack of membership sufficiently representative of all classes of farmers, lack of co-operation with similar organisations, lack of continuous and unselfish leadership. The farm bureau, it is claimed, has benefited by the experience of other organisations. It is not a social organisation, not an association for the purpose of lowering the prices of farm requisites and raising the prices of farm products, but an association of farmers who, by mutual co-operation, wish to investigate the fundamental problems involved in agricultural production.

Systematic Observation, Research, Experiment, and Record.

The theory that led to the farm bureau movement is that many of the farm problems have already been solved by individual farmers throughout the nation, but the solutions usually fall out of sight unnoted or are known only to particular individuals. Under the farm bureau scheme an attempt is being made to gather together in one county organisation the wide-awake and interested farmers who will compare their results with those of others, and in a systematic way plan out experiments and demonstrations on their own farms. Thus, the farm bureau may become a great experiment station with many observers, and a trained man—the farm adviser—to assist in interpreting results, point out new avenues of work and deduce conclusions from the evidence available. The conclusion is that the farm bureau can be of greater value to the community than the farm adviser and that together they can be of greater benefit than either alone. Though it must be emphasised that the main purpose of the farm bureaux is to increase the local knowledge of agricultural fact, many organisations act as general guardians of rural affairs and take the lead in advocating good roads, better schools, cheaper methods of buying and selling, and in promoting social institutions of country life.

A Live Factor in Rural Progress.

In some States the farm bureaux were not at first promoted by agricultural colleges, but were looked upon as a somewhat dangerous and untried procedure which might wreck the move for agricultural extension by paid workers. Later, this fear passed and the Colleges of Agriculture came to welcome the farm bureau as they saw more fully its possibilities of development and the progress which might be made in agricultural extension work when it was furthered by a large body of farmers. In the State of California, however, the value of the farm bureau was recognised from the beginning, and the College of Agriculture required every county which requested the services of a farm adviser to first form a farm bureau. The wisdom of this step has been proved by the fact that no county of California which has taken up farm bureau work has abandoned that work.

Farmers Control Their Own Affairs.

In planning the California type of bureau the constitution was very carefully written in order that no Federal or State official might have any direction over it. The organisation was definitely placed in the hands of farmers elected from among their membership and representing agricultural communities of the county. The belief upon which the constitution was based was that the farmers were wholly competent to guide their own affairs. As to its permanency, the theory was that if organisations

could be formed which would have programmes of work based upon concrete and feasible projects for the development of the community, the county, the State, and the Nation, the farmers would continue to attend meetings because of the efficiency of the organisation and because of their interest and part in the work it was doing. While the method under which the community centres are organised and directed is the same throughout the State, yet because the problems of the communities differ, the projects they have stressed are widely divergent.

Meetings—Farm Prosperity—Agricultural Policy.

The meetings of the community centres are usually held monthly. They are sometimes open to the public, but the business of the meetings is the serious discussion of questions pertinent to the farm prosperity of the neighbourhood. Sometimes the members go for a well-planned day to see demonstration plots that show definite results or to look at a well-built barn or well-bred herd. Such a trip is an inspiration as well as a source of knowledge, but it must be undertaken with a serious purpose and not as a pleasure jaunt. Again, some of the meetings are devoted entirely to the study of some phase of agricultural practice, such as the use of lime, sprays and spraying, balanced rations, methods of testing seeds, and so on—the farm adviser explaining in detail and using a blackboard, if necessary. The directors and officers of the county bureau also meet every month at the bureau offices or at the farm adviser's office. The meetings are of such vital interest that the whole of the directors attend—the agricultural policies of the county are determined, sectional committees are appointed, reports are heard from each director representing a centre and from departmental committees, and general consideration is given to the plans of work to be undertaken by the bureau and the farm adviser. The meetings may or may not be open to the public.

Subsidiary Organisations.

In addition to the general organisation, the members of the centres may form subsidiary organisations for more frequent meetings or more direct work in special directions. Thus, for example, the dairymen may wish to carry on co-operative cow testing, to purchase pure-bred sires; the pig raisers may wish to stamp out disease or to specialise in one breed of swine; the alfalfa growers may desire to uniformly grade their hay or to store it in co-operatively owned storehouses; and it becomes necessary to establish several departments or sections within the community centre. Each section elects a section committee, which reports through the director representing the centre to a corresponding committee of the county bureau, which in turn reports to the whole bureau, which is the final court to consider plans and reports of the several sections. It is in this way that the united agricultural force of the whole county is given to enterprises undertaken by any section, and financial, moral, and universal backing is given to a group of men who, standing alone, would not have sufficient strength to accomplish effectively the desired end.

The Largest Farmers' Organisation in the World.

State Federations, consisting of representatives of the county bureaux, and a National Federation consisting of representatives of the State Federations are also in existence, and a member on joining becomes part of the largest farmers' organisation that the world has ever known, and which includes some 1,500,000 members, 1,600 county bureaux, and 45 State Federations.

Summarised, the complete organisation is as follows:—

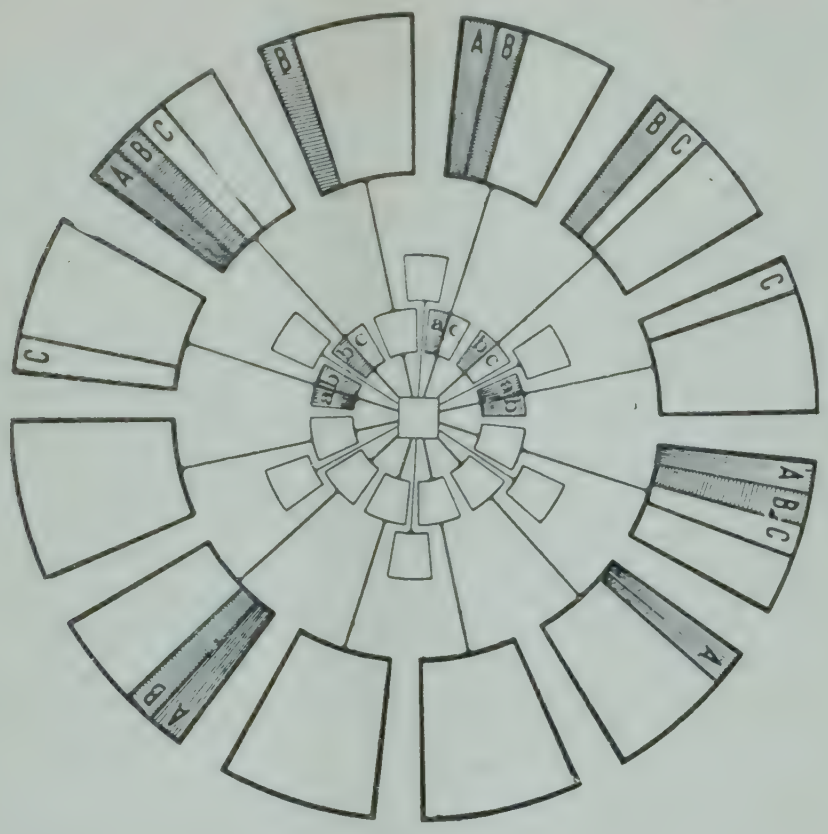
(1) Farm Bureau Centres, consisting of local farmers, who deal with local problems;

(2) County Farm Bureaux, consisting of representatives of the Farm Bureau Centres, who deal with county problems;

(3) State Federations, consisting of representatives of County Farm Bureaux, who deal with State problems;

(4) A National Federation, consisting of representatives of State Federations, which deals with national problems.

The following diagram illustrates the organisation of the county (district) bureau:—



A = Swine Breeders' Committee of the Farm Bureau Centres.
a = Swine Breeders' Committee of the County Farm Bureau.
A + a = Swine Breeders' Department of the Farm Bureau.
B = Cow Testing Committee of the Farm Bureau Centres.
b = Cow Testing Committee of the County Farm Bureau.
B + b = Cow Testing Department of the Farm Bureau.
C = Any Committee of the Farm Bureau Centres.
c = The same Committee of the County Farm Centres.
C + c = The same Department of the Farm Bureau.

THE FARM ADVISER.

Personality, Training, Qualifications.

A Farm Adviser is an official whose business it is to make available in practical form the results of the best-known farm practice and the knowledge of agricultural science, as developed by the State Experiment Stations and the Federal Department of Agriculture. He is expected to show by field demonstrations, publications, and otherwise, the application of such knowledge to local farm conditions. The Farm Adviser helps the settler or the beginner in the better selection of ground for certain crops, in better methods of planting, cultivating, pruning, spraying, harvesting, and marketing; he gives advice on soil treatment, fertilisation, animal husbandry, &c. Under the Californian system, the Farm Adviser is an officer of the Extension Service of the University College of Agriculture, and he is directly responsible to the Director of the Extension Service. His salary is paid by the College and the Federal Department of Agriculture co-operating. His travelling expenses are paid by the county to which he is attached. The most suitable Farm Adviser is the man who has been trained in agriculture, who is a graduate of a College of Agriculture, who has had practical experience, and who is familiar with the problems which concern the particular locality. It is essential that he should

possess enthusiasm, energy, and tact. As the success of agricultural extension work depends so much upon the Farm Advisers, the College will not appoint men until it is satisfied that they are qualified; rather will the College leave vacancies unfilled until efficient men are available. The Farm Adviser now works in conjunction with the Farm Bureau; in fact, a Farm Adviser is not appointed until a Farm Bureau has been organised. This arrangement has been made so as to facilitate the work of the Adviser, to conserve his time, to extend the range of his activities, and to provide an organisation to reach easily and quickly every community in the county. Under this scheme, also, the Farm Adviser himself gets the counsel and advice of the best farmers in the county, in addition to the assistance of the whole of the forces of the Agricultural College and the Federal Department of Agriculture.

Relationship of Farm Adviser to the Farm Bureau.

The value of the Farm Adviser to the producers is in having the unbiased judgment of an official who does not represent a local situation or local constituency, who is not subject to purely local control, whose appointment and term of office are not determined locally, but who represents the organised agricultural forces of the State and the knowledge that they have concerning the betterment of rural life. His value to the producers is in precise proportion to the extent to which he knows and tells the truth. He may advise the farm bureau (upon its request) as to the procedure which it may best follow, and may co-operate with it on most of the projects that it has under study, but in doing so it must be recognised that he is an official working for the benefit of the whole people.

On the other hand, the farm bureau is directed by the farmers through their representatives, who are directors of the bureau. When that bureau desires to carry on a project which is part or wholly in the nature of agricultural extension, then that part may properly come within the scope of the Farm Adviser. It may then draw up a written plan setting forth the work to be done, the means by which it is to be done, and the results they hope to accomplish, and clearly distinguish which part is to be done by the farm bureau, and which part by the Farm Adviser. This brings them into active co-operation on that particular project, but does not necessarily mean that the farm bureau will always work with the Farm Adviser, nor that the Farm Adviser is compelled to join in every movement that the farm bureau desires to further. To attempt to put the farm bureaux under the direction of the Government would deprive them of the primary reason for their existence, which is to represent the free and untrammelled action of the farmers of the country. Likewise, it would be unfortunate for the farm advisers to be placed under the direction of the bureaux, since it would deprive the farm advisers of their true mission, which is the advancement of the whole of the agricultural industry.

ORGANISATION IN QUEENSLAND.

What, then, can Queensland learn from the American organisation?

The American Farm Bureau organisation is very similar to our Queensland Producers' Association. The American Farm Bureau centres correspond with our Local Producers' Associations, the County Farm Bureaux with our District Councils, and the State Federation of Farm Bureaux with our Council of Agriculture. The Farm Adviser will not correspond exactly to our District Agents, but rather with the Instructors and Experts employed by the Department of Agriculture and Stock.

Co-Operation of the Queensland Producers' Association with the Department of Agriculture and Stock.

Under the Californian system the Farm Adviser is an officer of the College of Agriculture of the University of California. Seeing, however, that there is not a College of Agriculture in the Queensland University, then, so far as agricultural experts are concerned, the Queensland Department of Agriculture and Stock stands to the Queensland agricultural industry in the same relationship as the Californian College of Agriculture stands to the Californian agricultural industry. Seeing that

our experts and instructors are State officials, the control of them must remain with the State, but in the allotment of their duties, and in the making of the best use of their services for the benefit of the industry, there would be as cordial co-operation between the Council of Agriculture and the district councils on the one side and the Department of Agriculture on the other side as there is between the Californian Farm Bureaux and the Californian College of Agriculture. The Department of Agriculture would welcome an arrangement of the kind, provided that it were clearly understood that the control of the departmental officials must remain with the Department.

Efficient Administration.

For the effective discharge of the functions entrusted to the district councils and local producers associations by the P.P.O. Act, it is essential that an efficient administrative official should be attached to each district council—that official, whilst working under the direct control of the district council, however, should be an officer of the Council of Agriculture, and be under its general control. Keeping in view, therefore, the functions of the departmental experts and instructors, and the special duties which the district agent will be expected to perform, the type of officer required for the position of district agent will be one who has capacity for organisation and leadership, who has secretarial and business ability, who has had practical agricultural experience, and who knows local conditions.

The Future of the Queensland Producers' Association.

In regard to the future of the Queensland Producers' Association, American experience suggests—

(1) That the HOME RULE policy of the Association should be preserved zealously;

(2) That the Council of Agriculture should construct a definite programme for each section of the industry, and work consistently for the realisation of that programme, subject to such variations as developments from day to day require. The projects should consist of big essentials and not minor details, and the general aim should be to strengthen and assist existing co-operative agencies and not to absorb them. Similarly, the projects of the district councils and the local producers' associations should be planned at the beginning of each year, and these projects should deal generally with the requirements of the district as a whole, and specifically with the area covered by a L.P.A. or by a group of L.P.A.'s. Each district council should also assist the Council of Agriculture in the construction of its programme.

State Encouragement of Agriculture.

In regard to the activities of the State for the encouragement and organisation of agriculture, American methods suggest—

(1) That the State appropriation for agricultural purposes in Queensand should be as nearly as possible commensurate with the importance of primary industries to national existence, and keeping especially in view the adequate staffing of the Department of Agriculture and Stock.

(2) That adequate provision should be made for the agricultural training of future agricultural experts, including teaching staffs, field officers, and agriculturists, by an extension of agricultural education in the Rural Schools, and by the establishment of a College of Agriculture in the University.

(3) That there should be complete co-operation on the part of official experts and instructors with the Council of Agriculture, District Councils, and Local Producers' Associations.

The next Article of this Series, on Packing, Grading, and Marketing, will appear in the April Journal.

TOWNSVILLE STOCK EXPERIMENT STATION.

A YEAR'S REVIEW.

BY JOHN LEGG, B.Sc., B.V.Sc., M.R.C.V.S., Director.

The subjoined review is an abstract from the Annual Report of the Under Secretary for Agriculture and Stock (Mr. Ernest G. E. Scriven) to the Minister for submission to Parliament.

Several visits have been paid into country districts in connection with reported outbreaks of disease among stock. One long trip was again paid to the Gilbert River this year with the Government Botanist, but, although it was hoped that some valuable evidence would be obtained in connection with the disease known as the Gilbert River horse disease, only two cases of the disease were seen, and both of these were probably atypical.

Immunisation of Cattle Against Tick Feve

The stud cattle received for inoculation for the year ending 30th June, 1922, consisted of 72 bulls and 7 heifers.

The method of inoculation was that usually practised and needs little comment—the blood being used soon after being drawn from a recovered animal, usually in doses of 5cc., but occasionally larger. Where larger doses have been used, no material difference has been noted in the type of reaction produced. This, of course, is what would be expected, as the type of reaction does not depend on the size of the dose, but upon the susceptibility of the animal inoculated, and, perhaps, to some extent, on the particular strain of organism used. It is worth noting here in this connection that all the deaths that have occurred from redwater in the Townsville Experiment Station in the last two years have followed the use of blood from one particular animal, and it has been noticed on several occasions that blood from this particular animal tends to produce a type of reaction severer than that of several other animals used.

Testing of Bleeders.—It is necessary to test fresh recovered animals occasionally in order to ascertain whether they can be used as bleeders, because it is found that at times the blood of some animals is not capable of setting up reactions in susceptible cattle. Blood from animals from tick-infested country, and themselves being infested with ticks, has been repeatedly tested by the writer and found to be incapable of producing a reaction in susceptible cattle.

Unfortunately, there is no other method of testing blood than by inoculation in susceptible cattle, and the supply of these latter is not always available.

Claim has been made that by a special method of staining piroplasms could be detected in the blood of recovered animals (Pound; Annual Report, Department Agriculture, Queensland, 1919-20), but, unfortunately, in the report referred to no details of the special method are given. As, however, the inability to detect piroplasms in the blood of recovered animals under ordinary circumstances is not due to our inability to stain them (for there are some very excellent stains used in the detection of protozoa in the blood, such as the Leishmann, Giemsa, and Jenner methods), but to their comparative rarity in the blood, it is not likely that such a claim will be substantiated.

At the present moment the only method of testing blood is the one indicated.

Mortality at Experiment Station.—During the two years ended 30th June, 1922, 278 head of cattle have been received at the Townsville Experimental Station for inoculation purposes. Particulars of the deaths that have occurred are as follows:—

Animal.	Date of Death.	Cause of Death.
Bull ..	12 July, 1921	Septicæmia, abscess formation
Bull ..	17 June, 1921	Arsenic poisoning after dipping
Bull ..	25 May, 1921 (destroyed)	Abscess hock
Bull ..	4 August, 1921	Tick fever
Bull ..	5 August, 1921	Tick fever
Bull ..	2 September, 1921	Gastric tympany
Bull ..	7 December, 1921	Tick fever
Bull ..	7 December, 1921	Tick fever
Bull ..	10 January, 1922 (destroyed)	Tick fever and abscesses
Bull ..	10 June, 1922	Tick fever

Total deaths, 10. Percentage, 3·6 per cent.

Deaths from Tick Fever, 6. Percentage, 2·16 per cent.

It will be noted in the above table that two deaths from redwater occurred on 7th December, 1921, and one bull was destroyed on 10th January, 1922. These were three animals from a lot of twelve bulls which had been inoculated at the end of November, 1921. Unfortunately, commencing about ten days after the inoculation, and when the animals were at the height of their reactions, a few days of very hot weather were experienced. The whole twelve animals were very much distressed, two dying and one other becoming very much weakened, and finally developing abscesses in the knees and elbows where the skin had been bruised, thus necessitating its destruction on the 10th January following. It is believed that, although the mortality from redwater has been comparatively low during the last two years, had cooler weather been experienced when this particular lot of animals was inoculated, the mortality would have been lower still.

Loss of Virulency in Redwater Blood after being drawn.—In my last annual report I drew attention to the possibility of blood losing its infectivity soon after being drawn from an animal used for bleeding purposes. The question is of great importance, for the reasons mentioned in the report referred to. No experiments have recently been performed in this connection at Townsville, owing to there being no susceptible cattle available for inoculation purposes; but towards the middle of last year three samples of blood were received at Townsville from the Yeerongpilly Experimental Station for inoculation purposes, and the manner in which this blood was used constituted an ideal experiment. It is presumed, of course, that these samples of blood would all have been drawn from bleeders which had been tested before, although the writer is not certain on this point. It was not anticipated that this blood would prove avirulent, but it did so, and, although the samples were tested on several head of susceptible cattle, in *not one instance was a reaction produced,* and each and every one of the cattle so inoculated proved subsequently to be susceptible to the disease.

The following is extracted from a report forwarded to the Chief Inspector of Stock, dated 10th August, 1921. The samples of blood received are marked Y1, Y2, and Y3 respectively:—

Sample Y1. Received 23/5/21. Approximate age 96 hours.
Sample Y2. Received 7/6/21. Approximate age 96 hours.
Sample Y3. Received 15/6/21. Approximate age 120 hours.

The three samples have been named Y1, Y2, and Y3, and will be referred to as such throughout. In each case the inoculation was made behind the near shoulder with a 5 cc. sterile hypodermic syringe as soon as the bottle was opened, and with the usual antiseptic precautions.

Bull No. 28.—Two-year-old Shorthorn. Imported from New South Wales:—

23/5/21. Inoculated 10 cc. blood, sample Y1.

24/5/21. Temperature rose to 105·6.

25/5/21. Temperature 105·4.

26/5/21. Temperature normal.

7/6/21. Inoculated 5 cc. blood, sample Y2. Night of 7th temperature rose to 104·8. Fell to normal next morning.

14/6/21. Bull turned into yard at owner's request.

Blood smears taken 23/5/21 to 14/6/21 were all negative.

Temperature and smears were not continued long enough to ascertain whether the animal had reacted after the second inoculation, but the bull showed no signs of illness.

12/7/21. Inoculated 5 cc. blood from one of our own bleeders "B." Temperature fluctuated from 12/7/21 to 24/7/21 between 101·5 and 103.

Smears over these dates were negative.

25/7/21. Temperature 102·8. Blood smears showed numerous piroplasma bigeminum.

26/7/21 (morning). Temperature 106·6. Blood smears showed fully 25 p.c. of red blood corpuscles invaded by the piroplasms.

(Midnight). Temperature 107·6. Animal prostrate, urine coffee-coloured. Laboured breathing. Gave 1 gram trypan blue in 100 cc. water.

27/7/21. Temperature 101·5. Smears showed very few parasites.

28/7/21. Temperature 101·5. Smears negative.

From this date on the animal made an uneventful recovery, its blood showing the usual lesions seen in piroplasmosis, poilikocytosis, polychromatophilia, granular basophilia, &c.

Bull No. 29.—Two-year-old Shorthorn. Imported from New South Wales. The history of this bull was exactly that of 28, being inoculated on same dates with same amounts of blood, turned out on the 14/7/21 at owner's request.

Its immunity was tested in the same manner on 12/7/21 by using 5 cc. blood of bleeder "B."

12/7/21. Inoculated with 5 cc. blood bleeder "B."
19/7/21. Temperature 103·2. Smears showed few piroplasms.
20/7/21. Temperature 103. Smears showed few piroplasms.
21/7/21. Temperature 104·6. Piroplasms scarce in blood.
22/7/21. Temperature 106·4. Piroplasms very numerous.
23/7/21. Temperature 101·6. Piroplasms very numerous.

Smears were continued until 27/7/21, when they were still positive, but as the animal's temperature had subsided it was turned out of the stalls.

Bull No. 37.—Two-year-old Devon. Imported from New South Wales:—

7/6/21. Inoculated 5 cc. blood sample Y2. Bull turned into yard on the 10th and kept under observation. It never showed any signs of illness and was got ready for show purposes. Owner then decided not to show the animal and it was tested as follows:—

13/7/21. Inoculated 5 cc. blood from bleeder "B."
19/7/21. Temperature 103·1. Piroplasms bigeminum numerous in blood.
20/7/21. Temperature 104·4. Piroplasms bigeminum very numerous.
21/7/21. Temperature 104·8. Piroplasms bigeminum very numerous.

Organisms were present in the blood for the next four days, when they gradually disappeared, the temperature at the same time falling gradually to normal. The blood showed the usual pathological changes seen in piroplasmosis, these gradually disappearing also, the animal making an uneventful recovery.

Bulls 67-76.—Ten young Shorthorn bulls, each inoculated with 5 cc. blood sample Y3 on 20/6/21. The animals were all treated the same way, hence are grouped together. As there were ten animals, the test of this blood can be considered as fairly exhaustive. Temperatures and smears were commenced on the 25/6/21 and continued until the middle of July. In no case did organisms appear in the blood of any of these animals, but the temperatures fluctuated somewhat. Many of the animals were, however, suffering from acute ophthalmia, which possibly influenced the temperatures.

Bulls 175-179.—Five young Shorthorn bulls inoculated with 5 cc. blood sample Y3 on 6/7/21. Temperatures and smears, taken between 16/7/21 and 19/7/21 inclusive, showed slight fluctuations in temperature, whilst smears were negative.

All these fifteen animals were then inoculated with the blood of bleeder "D," one of our own bleeders, but although blood examinations were continued they were negative in every case, and the temperatures showed no redwater reactions. This result was unexpected, because bleeder "D" had been tested on five consecutive bulls in June, and had given good reactions in each case. It was thought that the fifteen animals were immune as a result of the inoculation with blood on the 6/7/21 and our examination of the blood had been defective, inasmuch as we had been unable to detect organisms, although in all other cases previously we had no trouble in finding the piroplasm bigeminum, even though scanty.

It was then decided to again test the animals with the blood of bleeder "B," an animal which had never failed to produce a reaction in susceptible animals for a month previously. The inoculation was carried out on 19/7/21, a dose being 5 cc. in each case.

It is unnecessary to give the details of each of these fifteen cases, but in every one of the fifteen animals piroplasms appeared in the blood during the following fortnight, and remained in the blood for from one to six days. Several of the animals became very sick and passed red urine, and one, No. 70, died on the 5th August of redwater. This animal had shown a continuous high temperature from the eighth day after inoculation, with numerous organisms in its blood.

Conclusions.—

1. The blood sample Y1 when tested on susceptible bulls 28 and 29 produced no reaction and gave the animals no immunity to redwater.
2. That blood sample Y2 when tested on susceptible bulls 28, 29, and 37 produced no reaction and gave no immunity. Each of the above three animals passed through a typical redwater reaction some weeks subsequent to the above inoculations when inoculated with blood from bleeder "B."
3. That blood sample Y3 produced no reaction and conferred no immunity on bulls 67-76 and 175-179, each of these animals subsequently passing through a typical redwater reaction some weeks subsequent to the above inoculations when tested with blood from bleeder "B."

These experiments should be continued further, and we hope to be able to test this question in the near future by using blood from our own animals.

Analytical Branch.

The work of the analytical chemist is contained in Appendix 1 attached to this report. It is noted that many dip-owners are not sending in samples as required by the Act, and in view of the fact that so many samples are below the standard strength it is suggested that an example be made of one or two of the worst offenders and a prosecution instituted.

The registration of dips is kept well up by some stock inspectors each year. Other districts are very much behind. It is quite evident that the administration of this portion of the Act, at least, is largely a question of the personal element.

Tetanus.

This disease seems to be particularly rife in the small towns of the North. In many cases it runs a very acute course once symptoms have set in. It is believed that the organism does not vary very much in its virulency, and the acute course of the disease can only be put down to the individual susceptibility of the animal concerned.

Antitetanic sera have been used in many cases, but their value is very doubtful. It is intended to test the value of subcutaneous injections of magnesium sulphate solution in the near future, if possible.

Mastitis in Cattle.

This appears to be a fairly common disease, and affects many milking cows along the coast. The disease usually runs a benign course and is of a chronic nature. Frequently it does not show very much tendency to spread from one quarter to another, although it is commonly seen in several cattle belonging to the one herd and is apparently of a contagious nature. Owing to the present cheapness of cattle, it is advisable to turn any affected cattle into beef, and not attempt curative measures.

Vaccines are produced by commercial firms for the treatment of this condition, and also many so-called specifics for udder injection, but the value of these is very doubtful.

Gilbert River Horse Disease.

A visit was paid to the Gilbert River early in the year in order to study the symptoms of this disease, to make post-mortems, and to obtain pathological material if possible, and, with the Government Botanist, to make a survey of the plants of the area, as it has been long suspected that the disease has been of the nature of a plant poison.

The visit was very disappointing in many ways. It was expected that a considerable number of cases would occur during the wet season, as there were considerable rain and floods during the six weeks we remained on the river, yet only two cases of the disease occurred, and both these were probably atypical.

The post-mortem in these two cases showed two marked features—*i.e.*,very great distension and engorgement of the stomach with foodstuffs, and, microscopically, a peculiar mottled greenish condition of the liver, which on microscopic examination proved to be a condition of necrosis. It is believed that the condition of necrosis of the liver is the primary lesion in the disease and is sufficient to account for the symptoms, but a study of only two cases is not sufficient to allow of conclusions being drawn.

If this condition is found in all cases, it will bring the disease into line with the disease known as "Staggers" in South Africa and also another disease known as "Dunziekt" in the same country, both diseases being due to liver necrosis and both suspected as being due to plant poisoning.

No plants were found which might be likely to cause the condition, but there are several which it would be better to test. Included among these are some specimens of the genera *Crotalaria* and *Indigofera*.

Further study in connection with this disease should first be made by ascertaining whether this condition of hepatitis (and necrosis) occurs in all cases. At present it appears to be the significant lesion in the disease, but only further study will reveal as to whether it is invariable or not.

Blackleg.

Several reports of the previous Government Veterinary Surgeons in the North have indicated that this disease occurs periodically about the Don River in the Bowen District.

It is believed that many crude methods of vaccination are being used in connection with this disease, such as the inoculation of garlic and turpentine into the skin of the brisket.

Lantana Poisoning in Cattle.

This condition was fairly common during the last wet season, particularly in the Cairns District. As usual, it was commonly found among cattle brought down from the Tableland country by the butchers for killing purposes, these cattle, when being turned into paddocks along the coast, taking at once to the lantana. Cattle seem to have a much greater liking for the young shoots than for the older plants.

Septic Infection of the Feet of Imported Sheep.

During the cooler months of the year a large number of flock rams are imported from New South Wales into Queensland, and many of these pass through Townsville.

One consignment of about 200 was received in Townsville in April last, and many of these animals were suffering from injuries to the feet. The ten days that the sheep were on the boat were very wet ones, and the sheep were in all probability standing in water on iron decks a considerable portion of the time. A cracking of the skin between the toes of a good many was produced, probably owing to the animals slipping and sliding on the deck, and through these injuries infection had crept in. Small abscesses formed in between the toes and around the coronet, and there discharged a greensh-blue pus, and was probably due to the bacillus pyocyaneus. The animals became very distressed and were unable to shift about and obtain feed for themselves. The exact percentage of deaths is not known, but the mortality was very high.

Ankylostoma Duodenale in Pigs.

The discovery of this parasite, the common hookworm of man, in the pig in North Queensland is largely due to the initiative and energy of an officer of this Department (J. A. Rheuben, Slaughtering Inspector, Townsville). Particular credit is due in this instance to this officer, because several attempts had previously been made by those interested to ascertain whether this parasite occurred in the pig or not. All previous investigations have been negative in their results.

The following is extracted from the "Medical Journal of Australia," dated 5th November, 1921, under the heading "Notes on the finding of Ankylostoma duodenale in the Intestines of the Pig," by John Legg and J. A. Rheuben:—

O'Connor reported in the "Medical Journal of Australia" for 2nd October, 1920, the finding of Ankylostoma duodenale in the intestine of the pig in Funafuti, Ellice Island. Following on this, Maplestone reported in the "Medical Journal of Australia," on the examination of 182 pigs from the Townsville district of Queensland, with negative results in each case.

So far as the writers are aware, no case has been reported of the occurrence of Ankylostoma duodenale in the intestine of the pig in Australia.

During July last a small number of pigs from Cromarty, a small railway siding about 20 miles from Townsville, was killed, and in accordance with the usual practice, the intestines were examined by one of us (J.A.R.) for parasites.

In three of the animals nematodes closely resembling Ankylostoma duodenale (man) were found attached to the mucuous membrane of the duodenum; they were identified as such by Dr. G. Sweet, of the Melbourne University.

The pigs in question were semi-domesticated.

The discovery of the Ankylostoma duodenale in pigs in North Queensland would seem to us to be of importance, and to suggest the carrying out of experiments to ascertain with what facility pigs can be infected from human sources.

Paralysis in Dogs Due to the Bite of Scrub Ticks.

Paralysis in dogs seems to be fairly common in places along the coast in North Queensland. It was always believed that this was due to the bite of scrub ticks, but this had never been tested. A recent report of Dodd in the "Journal of Comparative Pathology and Therapeutics," Part 4, 1921, contains details of certain experiments which he has performed in this connection, which would seem to indicate that there is little doubt that this condition is caused by the bite of the scrub tick. The condition is more common in young than in old dogs. Dodd suggests that this is probably due to a greater susceptibility of the young animals.

JOHN LEGG,
B.Sc., B.V.Sc., M.R.C.V.S.

APPENDIX.

The analytical work performed during the year was principally in connection with dipping fluids, of which 538 samples were submitted, with the following result:—

·6 per cent.	(last year 1·4 per cent.)	contained up to 2 lb.	Arsenious Acid per 400 gallons.
3·6 per cent.	(last year ·9 per cent.)	contained from 2 to 4 lb.	
15·8 per cent.	(last year 15·6 per cent.)	contained from 4 to 6 lb.	
16.5 per cent.	(last year 16·6 per cent.)	contained from 6 to 7 lb.	
19·3 per cent.	(last year 21·1 per cent.)	contained from 7 to 8 lb.	
23·8 per cent.	(last year 20·3 per cent.)	contained from 8 to 9 lb.	
10·7 per cent.	(last year 11·1 per cent.)	contained from 9 to 10 lb.	
9·7 per cent.	(last year 13·0 per cent.)	contained 10 lb. and over	

of which—

81·5 per cent.	(last year 80·3 per cent.)	were free from oxidation	Arsenic Acid per 400 gallons.
1·2 per cent.	(last year 4·9 per cent.)	contained from 0 to ·5 lb.	
1·6 per cent.	(last year 1·3 per cent.)	contained from ·5 to 1 lb.	
4·3 per cent.	(last year 4·1 per cent.)	contained from 1 to 2 lb.	
4·2 per cent.	(last year 3·4 per cent.)	contained from 2 to 3 lb.	
7·2 per cent.	(last year 6·0 per cent.)	contained 3 lb. and over	

In addition there were also analysed:—

Dipping concentrates	5
Samples from departmental dip and spray	18
Waters (partial)	4
Arsenic	5
Viscera and stomach contents	23
Miscellaneous	6

whilst 19 pints of standard iodine were prepared and despatched, 10 pints being for the use of inspectors.

Dipping Fluids.

The number of samples submitted this year (538) shows a marked increase over the total (378) for last year, but the position in this regard is still very disappointing, as can be seen from the following table:—

Year.	Number Registered.	Number Submitted.
1919-1920	668 ..	539
1920-1921	456 ..	378
1921-1922	606 ..	538

Perhaps if a few prosecutions in several stock districts were made, under Regulations 29, 1, and 6 (analysis), and 30 (registrations) of the Diseases in Stock Act, owners might be made to realise that the Act just quoted is a very important and live one.

Although the number of registrations this year seem to be well forward (90 per cent. approximate), still a good number have only just come to hand, whereas they should be registered by 31st January.

Again, it should also be enforced that correct information be forwarded with each sample, and no analysis be carried out unless the form of questions (4th Schedule) accompanies such sample.

Viscera and Stomach Contents.

Of the twenty-three samples examined, the cause of death was ascertained in fifteen cases; the high percentage of positive results being accounted for by several samples from the same source being tested separately at different periods

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PURE SEEDS AND STOCK FOODS ACTS.

A YEAR'S ADMINISTRATION.

BY F. F. COLEMAN, Officer in Charge, Seeds, Fertilisers, and Stock Foods Investigation Branch.

The following administrative review is taken from the Annual Report of the Under Secretary for Agriculture and Stock (Mr. Ernest G. E. Scriven) to the Minister (Hon. W. N. Gillies) for presentation to Parliament:—

The operations of the Stock Foods Act have brought this branch into more constant touch with manufacturers, produce merchants, and general storekeepers, and the business has greatly increased.

The constant stream of callers has taken up a large amount of time, and many complex problems meriting immediate research have resulted, but, unfortunately, little can be done in this direction, owing to the increasing demands made on the staff by general work and the investigation of the many complaints received, all of which have been carefully considered, and forty-eight complaints as to the quality of agricultural seeds or stock foods investigated. This has necessitated the visiting of the undermentioned districts:—Allora, Atherton, Babinda, Brisbane, Bowen, Cairns, Clifton, Caboolture, Eumundi, Forest Hill, Gympie, Gayndah, Gordonvale, Killarney, Kingaroy, Landsborough, Mackay, Maryborough, Malanda, Murgon, Myola, Nambour, Nanango, Pomona, Peeramon, Rockhampton, Rosewood, Stanthorpe, Townsville, Toowoomba, Warwick, Woodford, Yangan, and Yungaburra.

Definition of Vendor.

A vendor under the Pure Seeds Acts is "any person who sells, or offers or exposes for sale, or contracts or agrees to sell, any seeds." It will therefore be noted that the common acceptance of the Acts as referring only to seedsmen is erroneous.

Large quantities of seeds are sold as seed for sowing by farmers, storekeepers, and produce merchants, most of whom are without any seed-cleaning machinery, or any desire to obtain even a set of suitable sieves or the cheapest of cleaning machines.

Purity Analyses.

Table I. gives the germinating capacity of the principal agricultural seeds, with the standards of germination prescribed by the regulations under the Acts. Table II. gives the purity analyses of the same, which are, with the exception of rye, tares, oats, and a few samples of lucerne, the produce of Queensland. Owing to the large quantities

of ungraded seeds held by produce merchants and frequently stored by them on behalf of the grower, it has been found necessary to alter the methods of examination and make complete purity analyses as well as germination tests of all sampes sent in for examination by vendors or obtained by an officer under the Acts. This has more than doubled the work, but it is now possible to identify a particular sample by keeping a careful record of its various characteristics.

Section 6 of the regulations permits of the sale by farmers of "as grown" seeds, providing such seeds are sold to seed merchants for cleaning or grading. Unfortunately, a definition of a seed merchant is not given in the regulations; it is, however, generally understood that a seed merchant refers to any vendor in a position to clean and handle seeds in large quantities; in other words, a seed merchant is any vendor with one or more efficient seed-cleaning machines and the will to put them to daily use.

Amending Legislation Suggested.

Consideration might well be given to such amending legislation as will provide for the registration of seed merchants, as defined by the preceding paragraph, to whom section 6 of the regulations applies, also to the compulsory labelling of all agricultural seeds. Such labelling is in operation in other countries, the label attached to each package giving the following particulars:—

Kind of seed:
Where grown:
Purity, per cent.:
Inert matter, per cent.:
Weed seeds, per cent.:
Germination, per cent.:
Date of test:
Name and address of vendor:

Under the Pure Seeds Acts the seller must give to the buyer an invoice stating that the seeds are for planting or sowing, and that they contain no greater proportion or amount of foreign ingredients than is prescribed. Vendors, however, frequently give an invoice without first ascertaining the purity or germination of the seed. No one can honestly give any such document without an analysis of a sample drawn from the actual bulk in the seller's possession. Even such articles as oats, barley, &c., of which both buyers and sellers may be able to judge the market price, require a purity analysis and germination test.

Imported Seeds.

Table III. gives the purity and germination of the principal imported seeds, with the countries from which they were shipped. It does not always follow that the port of shipment is in the country of origin. From the table it will be observed that the purity and germination is, on the whole, satisfactory.

It is proposed to make a similar Table for vegetable seeds sold by the various vendors in small packets. Many complaints were received as to the poor germination of vegetable seeds purchased by market gardeners, several samples of cabbage growing less than 20 per cent., carrots less than 29 per cent., and cucumbers less than 20 per cent. The vendors of such seeds would therefore be well advised to destroy their old stocks and rely on the freshly imported seeds referred to in Table III.

In addition to the vegetable seeds above mentioned, 177 consignments were imported by parcels post. These contained hundreds of small commercial quantities, the quality of which were not up to the bulk seeds, and many small lots imported by private persons contained weed seeds. All such packages when large enough were recleaned in quarantine.

Misuse of Certificates.

Attention has been directed to the misuse of certificates relating to samples sent in by vendors, which certificates are not a guarantee by the Department as to the quality of the bulk that the sample is supposed to represent, but a plain statement of facts revealed by a purity analysis and germination test of the sample received. Both buyers and sellers are encouraged to send in samples for analysis, the report in most cases being in the form of a certificate, for which a fee of 2s. 6d. is charged. It is of the utmost importance that the samples be drawn from the actual seed in the sender's possession and that they be truly representative of the bulk. Instructions as to sampling, &c., have been issued in leaflet form; nevertheless, every month brings many samples of both seeds and stock foods without the name or address of sender. Over 200 of such samples came in during the last six months. Nearly as many were too small for any determination to be made. Unless proper care is exercised by senders, delays in the issue of reports will continually occur.

TABLE I.

GERMINATING CAPACITY OF AGRICULTURAL SEEDS, 1921-1922.

—	PERCENTAGE OF SAMPLES GERMINATING BETWEEN—										Standards of Germination prescribed by the Pure Seeds Acts.	
	100–90	89–80	79–70	69–60	59–50	49 40	39–30	29–20	19 10	9–0	A Grade.	B Grade.
	%	%	%	%	%	%	%	%	%	%	%	%
Barley, Cape	100·0	..	..	..	..	..	..	..	..	..	90	75
Barley, Skinless	30·8	53·9	7·6	7·7	..	..	..	..	..	..	90	75
Canary	22·3	55·5	11·1	..	11·1	..	..	..	..	..	75	60
Cowpea*	34·5	17·2	17·2	10·3	3·5	6·9	6·9	3·5	..	..	75	65
Lucerne*	8·3	18·7	20·8	31·3	14·6	2·1	2·1	2·1	..	..	80	60
Millet, Foxtail (Setaria) ..	51·9	29·6	7·4	..	..	7·4	..	3·7	..	..	75	60
Millet, Japanese	65·3	10·2	6·1	6·1	2·1	2·1	2·0	4·1	2·0	..	75	60
Oats	77·3	15·9	4·5	..	..	..	..	..	..	2·3	85	70
Panicum, White	16·0	32·0	20·0	16·0	4·0	..	4·0	8·0	..	..	75	60
Paspalum	..	..	..	..	..	10·9	5·5	16·4	21·8	45·4	25	10
Prairie Grass	4·2	12·5	12·5	29·1	12·5	8·2	4·2	8·4	..	8·4	60	40
Rhodes Grass	..	..	1·1	7·4	15·8	19·5	21·6	14·2	14·6	5·8	35	20
Rye	20·0	..	40·0	..	..	20·0	20·0	..	..	..	90	75
Sorghum	20·0	30·0	35·0	10·0	5·0	..	..	..	..	..	75	60
Sudan Grass	26·4	36·1	16·6	6·9	7·0	4·2	1·4	..	..	1·4	75	60
Tares	100·0	..	..	..	..	..	..	..	..	..	80	65
Beans, Canadian Wonder	70·6	17·6	..	..	..	11·8	..	..	..	..	75	65
Peas	61·1	22·2	5·6	..	..	5·6	..	5·5	..	..	80	65

* Lucerne and Black Cowpea Seeds of Queensland growth frequently contain a large amount of Hard Seeds, which are seeds with seed coats so impervious to water as to delay germination. The figures appearing below give the average plus amount in the samples germinating between the percentages at the top of the column. When the amount of Hard Seeds present in any sample exceeds 10 per cent., it is obvious that the effective germination is greatly reduced.

—	100-90	89-80	79-70	69-60	59-50	49-40	39-30	29-20	19-10	9-0
	%	%	%	%	%	%	%	%	%	%
Percentage of hard seeds in Lucerne	5·0	10·7	13·8	23·6	39·7	48·0	54·0	..	..	..
Percentage of hard seeds in Black Cowpea	..	3·0	12·4	4·0	..	47·0	..	..	..	..

TABLE II.

Purity Analyses of Agricultural Seeds, 1921-1922.

PERCENTAGE OF SAMPLES CONTAINING NOT MORE THAN 1 PER CENT. TO NOT MORE THAN 70 PER CENT. OF INERT MATTER AND WEED SEEDS.

—	1	2	3	4	5	10	20	30	40	50	60	70	Principal Weed Seeds in their order of occurrence.*					
	%	%	%	%	%	%	%	%	%	%	%	%						
Barley, Cape ..	30·7	..	69·3	..	..	..	..	..	..	..	..	..	1	47	48	30	34	2
Barley, Skinless ..	..	..	46·2	..	30·8	23·0	..	..	..	..	..	..	48	58	47	27	39	..
Canary	..	..	22·3	..	22·3	55·4	..	..	..	..	..	..	27	19	45	30	41	7
Cowpea	37·9	13·8	20·7	3·5	6·9	10·3	6·9	..	..	..	..	..	35	49	..	..	..	..
Lucerne	12·5	12·5	45·9	6·3	6·2	8·3	8·3	..	..	..	..	..	11	42	45	3	50	34
Millet, Foxtail .. (Setaria)	14·8	3·7	48·2	3·7	25·9	3·7	..	..	..	..	..	..	28	12	36	3	19	50
Millet, Japanese ..	18·4	16·3	38·8	10·2	12·2	2·1	..	2·0	..	..	..	..	39	3	41	45	19	58
Oats	8·0	12·0	34·0	8·0	18·0	16·0	4·0	..	..	..	..	..	1	30	8	34	45	19
Panicum, White ..	20·0	8·0	56·0	..	8·0	8·0	..	..	..	..	..	..	39	22	50	61	49	11
Paspalum	20·3	18·6	37·3	5·1	13·6	3·4	1·7	..	..	..	..	..	39	22	45	23	61	49
Prairie Grass ..	12·5	8·4	29·1	4·2	29·1	4·2	4·2	8·3	..	..	..	..	1	47	2	37	31	32
Rhodes Grass ..	3·7	14·6	22·7	13·2	14·2	17·9	10·0	0·5	..	1·1	1·6	0·5	13	24	39	59	11	60
Rye	20·0	..	80·0	..	..	..	..	..	..	..	..	..	8	1	62	..	..	..
Sorghum	25·0	..	45·0	5·0	15·0	10·0	contained inert matter						..	..	..	..	..	..
Sudan Grass ..	5·5	8·3	57·0	5·6	12·5	9·7	1·4	..	..	..	..	..	39	19	28	3	11	16
Tares	50·0	..	..	..	50·0	..	..	..	..	..	..	..	7	33	45	11	..	..
Beans .. .. (Canadian Wonder)	64·7	..	29·4	5·9	contained	inert	matter		..	..	..	..	..	..	..	..	..	..
Peas	55·0	5·0	40·0	contained	inert	matter			..	..	..	..	..	..	..	..	..	..

The Standard of Purity prescribed for A Grade Seeds is not more than 2 per cent. of inert matter, not more than 1 per cent. Weed seeds. For B Grade Seeds not more than 3 per cent. of inert matter, not more than 2 per cent. Weed seeds. These standards apply to all seeds herein mentioned, except Barley, Oats, and Rye, the standards for which are—A Grade not more than 1 per cent. of Inert Matter, 1 per cent. Weed Seeds, and 1 per cent. of any cultivated cereal other than the kind to which the sample belongs. Seeds less in diameter than one-fourteenth of an inch none. The Standard for B Grade gives a greater latitude.

* See note next page.

*WEED SEEDS OF FREQUENT OCCURRENCE.

1 *Avena fatua,* Wild Oat.
c2 *Apium, sp.*
3 *Amarantus sp.*
4 *Aristida sp.,* Spear Grass.
5 *Andropogon sp.*
a6 *Anagallis arvensis,* Common Pimpernel.
c7 *Brassica sp.*
8 *Bromus maximus,* Great Brome.
9 *Bromus mollis,* Soft Brome Grass.
10 *Bidens pilosa,* Cobbler's Pegs.
c11 *Chenopodium sp.*
c12 *Centaurea Melitensis,* Star Thistle.
13 *Chloris divaricata.*
14 *Chloris barbata.*
15 *Chloris truncata.*
16 *Cnicus lanceolatus,* The Common Thistle.
17 *Cuscuta sp.,* Dodder.
18 *Caucalis sp.*
a19 *Datura stramonium,* Thorn Apple.
20 *Diplachne parviflora.*
c21 *Daucus brachiatus.*
22 *Eleusine indica,* Crow's Foot.
23 *Erichloa punctata,* Early Spring Grass.
24 *Erigeron linifolius.*
25 *Eragrostis sp.*
26 *Festuca sp.,* Fescue.
c27 *Geranium dissectum,* Cut-leaved Geranium.
28 *Hibiscus trionum,* Bladder Ketmia.
c29 *Hypochœris, sp.,* Cat's Ear.
b30 *Lolium temulentum,* Darnel.
c31 *Lepidium ruderale,* Waste-places Cress.
32 *Lithospermum arvense,* Corn Gromwell.
c33 *Lepidium campestre,* Pepper Grass.
c34 *Melilotus parviflora,* Hexham Scent.
35 *Malvastrum tricuspidatum,* False Mallow.
c36 *Marrubium vulgare,* White Horehound.
37 *Malva parviflora,* Small-flowered Mallow.
c38 *Medicago denticulata,* Medic Burr.
39 *Panicum sanguinale,* Summer Grass.
40 *Panicum decompositum,* Barley Grass.
41 *Polygonum convolvulus,* Climbing Buckwheat.
42 *Polygonum aviculare,* Wireweed.
43 *Plantago lanceolata,* Rib Grass.
44 *Portulaca oleracea,* Pig Weed.
45 *Rumex sp.,* Dock.
c46 *Raphanus Raphanistrum,* Wild Radish.
47 *Sonchus sp.,* Sow Thistle.
48 *Silybum marianum,* Virgin Mary's Thistle.
49 *Sida rhombifolia,* Sida Weed.
b50 *Stachys arvensis,* Stagger Weed.
b51 *Solanum nigrum,* Black Nightshade.
52 *Salvia Verbenaca,* Wild Sage.
53 *Stellaria media,* Common Chickweed.
54 *Silene Gallica,* French Catchfly.
c55 *Sisymbrium orientale,* Oriental Rocket.
56 *Spergula arvensis,* Corn Spurry.
57 *Stipa sp.*
58 *Tribulus terrestris,* Bulls Head, Caltrops.
59 *Tricholœna Teneriffœ,* Red Natal Grass.
c60 *Tagetes glandulifera,* Stinking Rodger.
61 *Verbena sp.,* Purple Top.
62 *Vicia sp.,* Wild Tare.
63 *Xanthium spinosum,* Bathurst Burr.

a Poisonous. *b* Suspected poisonous. *c* Impart a bad flavour to butter.

TABLE III.

GERMINATING CAPACITY AND PURITY OF THE PRINCIPAL SEEDS IMPORTED INTO QUEENSLAND DURING 1921-1922.

—	Imported from—	Percentage of Samples Germinating Between—								Standard of Germination prescribed by the Pure Seeds Acts.	Standard of Purity not more than 2 per cent. Inert Matter, 1 per cent. Weed Seeds. Percentage of Samples up to prescribed Standard.
		100-90.	89-80.	79-70.	69-60.	59-50.	49-40.	39-30.	29-0.		
		%	%	%	%	%	%	%	%	%	%
Beet	Holland, England, U.S.A.	..	8·8	38·2	35·3	11·8	5·9	..	..	55	100
Beans, Lima	U.S.A.	60·0	40·0	..	..	..	..	..	..	75	100
Beans, Broad	New Zealand, Holland	100·0	..	..	..	..	..	..	..	75	100
Beans, French	U.S.A., New Zealand, Holland	84·2	10·5	5·3	..	..	..	..	..	75	100
Beans, Mauritius	Fiji	100·0	..	..	..	..	..	..	..	75	100
Cabbage	Holland, England, U.S.A.	27·6	57·6	12·7	..	2·1	..	..	..	65	100
Cauliflower	Holland, Italy, England	35·7	21·5	35·7	..	7·1	..	..	..	60	100
Carrot	Holland, England, U.S.A.	..	17·2	13·8	34·5	20·7	6·9	..	6·9	55	100
Cucumber	U.S.A., England, Italy	58·8	29·4	5·9	..	5·9	..	..	..	70	100
Leek	U.S.A.	..	..	66·7	..	..	33·3	..	..	50	100
Lettuce	U.S.A., Holland, England	70·8	16·7	8·4	..	4·1	..	..	..	65	99
Mangel	Holland, England	14·3	19·1	9·5	47·6	9·5	..	..	..	55	100
Melon	U.S.A.	16·7	58·4	13·9	2·8	5·5	2·7	..	..	65	100
Onion	New Zealand, England, France, U.S.A.	15·4	46·1	15·4	7·7	7·7	..	..	7·7	60	100
Peas	Holland	100·0	..	..	..	..	..	..	..	80	100
Parsley	Holland, U.S.A.	..	..	33·4	33·3	..	..	33·3	..	50	100
Parsnip	Holland	..	..	..	..	50·0	..	..	50·0	30	100
Radish	Holland, England, U.S.A.	34·8	17·4	34·7	13·1	..	..	..	..	60	99
Swede	Holland, England	33·3	40·0	26·7	..	..	..	..	..	65	100
Sweet Corn	U.S.A.	28·6	57·1	14·3	..	..	..	..	..	75	100
Tomato	U.S.A., Italy	5·9	47·0	35·3	11·8	..	..	..	..	65	100
Turnip	Holland, England, U.S.A.	65·4	26·9	..	..	7·7	..	..	..	65	100
Tobacco	U.S.A.	..	..	50·0	..	50·0	..	..	..	50	100
Hemp	Japan	Imported for feeding purposes—Purity ranging from 95 to 98 per cent.									
Linseed	New Zealand, Japan										
Millet, Red French	Japan										
Millet, White French	Japan										
Rape	Japan										

THE STOCK FOODS ACT.

Under section 3 of the Act every wholesale seller of such foods as bran, pollard, calf meal, poultry meal, or other mixed, concentrated, or perpared stock foods is required to send in each year, before the 31st of January, a sample, statutory declaration, specimen invoice, and label which is to be affixed to every package. To explain the requirements of the Act, circulars were mailed last December to every known wholesale seller within the State.

Samples of bran and pollard were taken from the various vendors or delivered in accordance with section 3 of the Act, a portion of each sample being sent to the Agricultural Chemist for chemical analysis.

For purposes of comparison, the following table gives the chemical analyses of the Queensland and Southern products:—

—	Manufactured in					
	Queensland.			Southern States.		
	Crude Protein.	Crude Fat.	Crude Fibre.	Crude Protein.	Crude Fat.	Crude Fibre.
	%	%	%	%	%	%
Bran—						
Average ..	16·2	4·2	10·0	15·0	3·0	10·4
Maximum ..	18·1	4·6	10·6	16·6	4·0	12·4
Minimum ..	14·8	3·8	9·2	14·4	2·0	8·3
Pollard—						
Average ..	16·1	3·6	5·6	14·9	3·3	7·9
Maximum ..	17·3	4·1	7·2	16·2	4·4	10·3
Minimum ..	15·4	2·6	4·3	14·3	2·7	4·5

Time has not permitted of a thorough microscopical examination of the samples. Traces, however, of *Lolium temulentum, Avena fatua, Brassica sinapis,* and other weeds were found in many of the brans, and in several instances the so-called pollards were not true pollards within the definition of the regulations. These remarks apply to both Southern and Queensland products; the latter, it will be noted from the above table, are of better average quality.

Vendor's Guarantee.

In many instances both meals and calf foods have not been up to the vendor's guarantee. In most cases the manufacturer has altered the label and reduced the figures given for protein or fat and increased that of fibre. The regulations under the Act do not prescribe a standard, but it is compulsory on the vendor to attach a label stating the minimum amount of crude protein and crude fat, with the maximum amount of crude fibre. The vendor therefore makes his own standard, and it is but reasonable to expect the vendor's goods to be up to his own guarantee.

The Farmer as a Consumer.

The farmer is not only the producer of the wheat or other grain, but the largest consumer of the various by-products; it therefore follows that he should have more than a passing interest in the quality of the foods purchased, the feeding value of which will improve as the buyers become more critical. Millers and other manufacturers are not wholly responsible for the weed-seeds and foreign matter of like nature that is found in stock foods; the root of the trouble is the farm where the grain or chaff was grown.

Exact Definitions Desired.

Several complaints were received from merchants regarding oats purchased from the Southern States. One sample contained over 11 per cent. of weed-seeds; another over 6 per cent. of weed-seeds, and nearly 5 per cent. of other foreign matter. It is to be regretted that both buyers and sellers base the so-called grades on general opinion, which is influenced by a rising or falling market. The same remarks apply to chaff; the words "prime" or "good and sound" are absolutely meaningless unless based on an exact definition. The words "reasonably free from foreign matter" do not imply any definite quality unless the amount and kinds of foreign matter are expressed on a percentage basis with the total prohibition of any substance deleterious to life or health of stock, such as *Ricinus communis* (castor-oil beans).

A Typical Instance.

A typical instance of deleterious matter occurred last August, when several trucks of chaff were found at Toowoomba, Brisbane, and Maryborough containing a large amount of *Datura stramonium* seeds. Fortunately the sales were stopped before any serious damage occurred. None of the merchants handling this line could at the time identify *Datura*, the presence of which the grower of the chaff is responsible for.

Every effort has been made to give the fullest possible information to any produce merchants or storekeepers desirous of obtaining a fuller knowledge of these impurities. The majority of vendors, however, are inclined to trust to their luck and ready wit when an officer makes an occasional visit to their store.

QUEENSLAND STOCK IN 1922.

By MAJOR A. H. CORY, M.R.C.V.S., Chief Inspector of Stock.

Abstracted from the Annual Report of the Under Secretary for Agriculture and Stock (Mr. Ernest G. E. Scriven) to the Minister (Hon. W. N. Gillies) for presentation to Parliament.

Stock Statistics.

The following figures supplied by the Government Statistician show an increase in horses, cattle, sheep, and pigs as compared with the previous year:—

Year.	Horses.	Cattle.	Sheep.	Pigs.
1921	742,217	6,455,667	17,404,840	104,370
1922	747,543	7,047,370	18,402,399	145,083
Increase	5,326	591,703	997,559	40,713

It is satisfactory to note the increase in the number of stock. There has been a general depression in the cattle industry owing to the low value of stock, and until oversea markets are established, there seems little likelihood of any permanent improvement. The sheep industry is in a much more satisfactory position, owing to the enhanced value of merino wools and mutton.

Horses Exported.

Eight hundred and seventy-six (876) horses were exported oversea, of which two hundred and eighty-two (282) were mares.

Examination of Stallions.

Examinations were held at the following places:—Brisbane, Laidley, Esk, Lawnton, Townsville, Beenleigh, Gympie, Nambour, Warwick, Goomeri, Kingaroy, Nanango, Dalby, Killarney, Georgetown, Gatton, Boonah, Lowood, Bundaberg, Rockhampton, Caboolture, Beaudesert, Toowoomba, Ipswich, Marburg, Mackay, Charters Towers.

Eighty (80) stallions were examined, of which number six (6) or 7.5 per cent. were rejected.

Tabulated results of the examination are as follow:—

——	Draught Horses.			Blood Horses.			Light Horses.			Ponies.			Totals.		
	Number Examined.	Number Certificated.	Percentage Rejected.	Number Examined.	Number Certificated.	Percentage Rejected.	Number Examined	Number Certificated.	Percentage Rejected.	Number Examined.	Number Certificated.	Percentage Rejected.	Number Examined.	Number Certificated.	Percentage Rejected.
	16	15	6·25	20	17	15·00	21	19	9·52	23	23	..	80	74	7·5
Defects.	Number Rejected.			Number Rejected.			Number Rejected.			Number Rejected.			Number Rejected.		
Sidebones ..	1	6·25		..	..		..	..		..	..		1	1·25	
Spavin	..	..		1	5·00		2	9·52		..	..		3	3·75	
Curb	..	..		1	5·00		..	..		..	..		1	1·25	
Want of type and conformation	..	..		1	5·00		..	..		..	..		1	1·25	
Totals ..	1	6·25		3	15·00		2	9·52		..	..		6	7·5	

Analytical Examinations.

Forty-nine (49) samples of viscera and contents were submitted to the Agricultural Chemist for analysis, and in twenty-two (22) cases poison was detected. In North Queensland twenty-three (23) samples were examined, of which fifteen (15) contained poison.

Interstate Conference.

A conference of the chief veterinarians and stock officials of the different States were held in Sydney in April last. The following subjects, among others, were dealt with:—

Uniformity with regard to stock and stock disease legislation.

The adoption of a uniform schedule of diseases of animals throughout the States.

That each State should undertake an educative campaign with the object of eliminating and eradicating pleuro-pneumonia contagiosa from Australia.

The diagnosis and control of swine fever and the restriction of interstate traffic in pigs.

Control of the cattle tick and the effect of cattle tick on interstate traffic.

Control of sheep louse and sheep tick.

The disposal of actinomycotic, tubercular, and cancerous cattle.

Conditions governing the export of cattle to Java and other countries.

Rabbit and vermin suppression.

Railways and their importance in suppressing the spread of animal diseases.

Certification and registration of stallions.

The passage of legislation governing the veterinary profession.

Consideration of the form of certification and notification in connection with interstate traffic in stock.

TICK BOARD.

Suppression of Tick Pest.

The activities of the Board have, during the year under review, been increasingly directed to the suppression of the tick pest in areas where sporadic outbreaks have occurred, and in the minimisation of the pest in the heavily tick-infested territory; also to the prevention of an extension of the present infested areas of the State.

It has been noted with satisfaction that stockowners generally are becoming more alive to their responsibilities, and efforts to secure their co-operation have been attended with more success than hitherto. It is obvious, however, that unless this co-operation is directed systematically, there is little hope that the objects of the Board can be fully achieved.

The local authorities throughout the State, with isolated exceptions, do not exhibit that practical sympathy which would be expected in efforts made to deal with the tick pest.

Stock Movements.

In the earlier portion of the year stock movements, especially in Northern areas, were considerably reduced owing to the fact that meatworks were not operating, but the traffic on routes converging on the Queensland Northern Railway is now very heavy.

Cattle have from time to time arrived at Julia Creek from Gulf areas in a heavily tick-infested condition, and the attention of those interested has been drawn to the necessity for dipping at the Government dip at Donor's Hills prior to further movement in a southerly direction. A subsequent dipping from seven to ten days prior to arrival at centres on the Queensland Northern Railway should also be arranged for, and if effective, this would permit stock to cross to centres south of the railway on one further dipping.

Large mobs of cattle have during the past year travelled through the Burnett areas to the Darling Downs, and dipping at Jarrah, Durah, and Boondooma, prior to entry on to the Downs, has been enforced in the interests of stockowners in the clean areas south of the Main Range. Owing to the difficulty in securing effective supervision by a permanent officer at Boondooma, the Burrandowan dip was commissioned for the cleansing of cattle travelling across the range *en route* to Jandowae and centres further south, but it may be possible to again use the Boondooma dip for that purpose when the services of an officer from the Kingaroy area can be detailed for supervisory duties.

Notwithstanding the close supervision and the application of restrictions on stock movements from tick-infested to clean country, it is regretted that an important extension of the area of infestation in Central-Western Queensland has occurred.

Tick-infested Travelling Stock.

In July, 1921, mobs of travelling stock from territory north of the Queensland Northern Railway were found tick-infested on arrival at Isisford after movement *viâ* Winton, Evesham, Maneroo, and Arrilalah. Immediate action was taken to ascertain, if possible, the source of infestation and to return the infested cattle on the route

travelled, and thence to Aramac for dipping. Exhaustive inquiries indicated that the cattle were clean on arrival at Winton, and as certain cattle depastured at Baratria, on the Winton-Maneroo route, were found infested, there is no doubt that these stock were responsible for the trouble. Every precaution was taken to prevent stock movements on or across the infested route until dipping facilities could be provided by stockowners or local authorities interested. The co-operation of the shire councils at Isisford and Blackall was sought and obtained to deal with spraying operations at those centres, and additional inspectors were detailed for duty at Isisford, Blackall, and Jundah. It was necessary to extend cleansing operations to Blackall in view of the fact that holdings on both sides of the Barcoo River were found infested. Stock from Northern areas for the south, travelling *viâ* Winton, were deviated at Evesham, *viâ* Camoola, to Aramac, for dipping, and were thence permitted to travel *viâ* Barcaldine, Jericho, and Tambo, avoiding Blackall. Close inspections have been periodically made of the infested route, also of adjoining holdings and town reserve, but no ticks have been found for some months.

This indicates a possibility that the outbreak has been successfully coped with, but development during the ensuing summer must be awaited before this can be assumed with any degree of certainty. The restrictions, therefore, will apply, with the exception of a variation to permit fat stock for immediate slaughter, from holdings west of the Maneroo route, crossing that route direct to Longreach to the trucks.

The Board also decided recently that as there is no danger to be apprehended by the movement of stock *viâ* Blackall from Barcaldine, this route has now been opened, and cattle may travel through Blackall *en route* to Tambo and southern areas.

Regular dippings or spraying and inspections were carried out in centres on the Darling Downs, where sporadic outbreaks of ticks occurred during the previous year, and restrictions on movements of travelling stock in the Clifton, Pratten, Dalby, and Pittsworth areas have now been removed.

Unfortunately, in March last ticks were found on cattle at Yeulba, but as the route between the Main Range and the railway on which the infested cattle had travelled was found clean, it was not considered that infestation occurred from that source. Upon further inquiry, it was ascertained that some cows had been introduced from the Brisbane district. These cattle were dipped twice in approved dips and found free from ticks before permission was granted to truck for Yeulba, but the stock were not trucked for some twenty-four hours after dipping, as it was considered, until recent investigations proved otherwise, that dipping would prevent larval ticks from attaching themselves to animals for at least thirty-six hours after dipping. It has since been proved that larval ticks will attach themselves within eighteen hours, which probably occurred in this case. The infested cattle were periodically sprayed until clean, and all cattle on suspected holdings were mustered and crush-inspected, but were not found infested.

Isolated outbreaks also occurred at Macalister and Bowenville, but after necessary spraying restrictions had been periodically applied, and frequent inspections had revealed the fact that the infested areas were clean, quarantine restrictions imposed of the discovery of the outbreaks were removed.

Certain tick-infested cattle arrived at Jondaryan from the Boonah district in April last, but the ticks were noted immediately on arrival, and the cattle were returned to their original pastures.

The Railway Department has co-operated with the Board in respect of the disinfection of stock trucks, but until provision is made for the establishment of central depôts for that purpose it will be difficult to secure thoroughly effective results.

Helidon Cleansing Area.

The work carried out in this area has been attended with successful results. In January last a considerable portion was declared clean, and restrictions were removed. The area has been enlarged, as it was found necessary to extend the boundaries to conform with watersheds. By so doing, we now have included therein a large portion of rough, grossly tick-infested country adjoining Cressbrook Creek and the Anduramba road. The officer in charge of the area reports that infestation has been greatly reduced in these localities by frequent periodical dippings, and he anticipates that with the co-operation of stockowners, which is cheerfully extended, the majority of the infested holdings will be cleaned in the ensuing twelve months.

Holdings inspected	4,201
Horses inspected	10,165
Cattle inspected	152,327
Sheep inspected	158
Number of infested holdings	499
Number of stock dipped	46,188

South Burnett Cleansing Area.

As reported last year, the southern portion of this area, comprising about 1,280 holdings and aggregating approximately 220,000 acres, has remained clean, with the exception of sporadic outbreaks caused by the passage of certain tick-infested stock. Although precautions were taken to prevent infested stock gaining admission to the cleansing areas, it is found practically impossible at times owing to irregularities on the part of owners of travelling stock.

An officer has been stationed at Wondai for a considerable period to prevent the introduction of tick-infested stock from the northern portion of the gazetted cleansing area, and also to supervise the dipping of stock grazing on the northern boundary. It has been decided that the present southern portion of the cleansing area is a sufficient buffer to the clean country on its southern boundary; therefore, the cleansing work will not be continued in the northern portion, but operations will be extended in a westerly direction to include the parishes of Durong and Boondooma, which will link up this area with the Miles-Chinchilla area.

Holdings inspected	832
Stock inspected	65,107
Infested holdings	207
Stock dipped	41,151

Miles-Chinchilla Area.

During the early portion of the year under review repeated applications were made for the removal of restrictions applicable to this area. After full reports had been received from the officer in charge it was decided to release the greater portion of the area from cleansing operations. However, in view of the possibility of infection due to the movement of tick-infested cattle to Chinchilla, it was decided that action for the release of the south-eastern portion of the area should be deferred until there is evidence that no danger is to be apprehended as a result thereof.

Holdings inspected	531
Stock inspected	41,150
Infested holdings	—
Stock dipped	—

South Coast Area.

Regular dipping of stock was carried out in the Coolangatta town area. It was not considered expedient at present to extend operations to the other portion of the proclaimed area, which extends to the Logan River. Straying stock on roads at Tugun were dipped as a precaution against their surreptitious entry into the Coolangatta town area. Notwithstanding the precautions taken, stock were found tick-infested in the Coolangatta area in the months of March and April last.

Dips.

The total number of dips registered in the State totals 4,163, as compared with 3,976 last year.

Particulars of dips registered in the various stock districts are as follow:—

District.	Number.
Barcaldine	3
Bowen	205
Brisbane	1,047
Cairns	202
Clermont	53
Cloncurry	40
Cooktown	39
Gladstone	323
Hughenden	34
Maryborough	1,290
Normanton	32
Rockhampton	446
Roma	43
Springsure	60
Toowoomba	93
Townsville	217
Warwick	34
Winton	2
Total	4,163

Dipping Fluids.

One thousand one hundred and fifty samples of dipping fluids were analysed, viz., 612 from Southern and Central Queensland, and 538 in North Queensland. As reported previously, the regulation providing for the compulsory analysis of dipping fluids twice annually is not enforced except in proclaimed cleansing areas or in cases where dips are recognised by the Department for the cleansing of stock prior to movement into tick-free country. In these cases it is found necessary to regulate intervals between the analyses of dip fluids to conform with the number of stock dipped or the addition of fresh concentrate. The portable testers supplied to stock inspectors have been found most useful for field tests, more particularly in isolated centres where samples could not be analysed for a considerable period. No less than 52 pints of standardised iodine solution was supplied to the various inspectors by the agricultural chemist.

DISEASES IN STOCK.

The members of the veterinary staff have made 356 visits to various centres in Southern and Central Queensland (Appendix I. deals specifically with North Queensland). The distances travelled in many cases were very great, as can be readily understood when the size of this State is considered, but much useful knowledge has been disseminated and practical aid given to numerous stockowners. The testing of cows for tuberculosis was carried out free of cost, but prior to the test the consent of owners was obtained in all cases for the destruction of animals which reacted. The health of stock generally has been good, and no outbreaks of any new infectious diseases were noted. Cases of poisoning were investigated in several districts, due in most cases to poisonous vegetation. Cases of arsenical poisoning were also investigated, and were chiefly associated with the destruction of prickly-pear. In most instances stock were not removed from the paddock while the work of destruction was in progress, with the inevitable result that the animals consumed the poisoned pear. Treatment in many cases was impracticable, as the animals were unaccustomed to being handled. With quiet cattle the administration of moist peroxide of iron has been found very successful. The only practical method of dealing with these cases is to remove stock from the paddocks where pear is being treated, or by eradication of the poisoned pear before stock are allowed to graze in the paddocks.

Mycotic Poisoning.

In a few instances mycotic poisoning came under notice, due to the growth of moulds on dry grasses, following a propitious season. The cutting of the natural grasses for conservation as hay or silage is undoubtedly a precaution against mycotic poisoning, and also serves as an asset in drought periods, although an impression has gained ground that the natural grasses are useless when conserved for fodder. If the fodder is used as hay, or cut into chaff, and is sprinkled with a mixture of molasses and water, which adds to the digestibility and palatability, it is a very wholesome and desirable article of food, on which stock do well for considerable periods. The molasses acts to a slight extent as a corrective to fungi poisoning, in that it assists a healthy and normal bowel action.

Pleuro-Pneumonia Contagiosa.

Seventy cases of this disease have been reported, as compared with sixty-six last year. The usual quarantine of three months after successful inoculation has been enforced. It was resolved at the Interstate Conference held in Sydney to reduce the quarantine period to two months.

So-called Caterpillar Plague Affecting Cattle.

Early in July information was received from the Roma District that large numbers of cattle had died and that others were sick, the result of eating so-called caterpillars.

The District Inspector of Stock, Roma, was wired to for confirmation of the news, but before receiving his reply, Mr. Armstrong (officer in charge of the Soldiers' Settlement, Gunneview), reported that losses of stock were occurring on Westgrove Station, about 100 miles north of Roma, and arrangements were at once made to personally visit Westgrove. Mr. Harding, the manager, very kindly placed his motor-car, horses, and men at our disposal, and, although we rode over Westgrove, and made inquiry from adjoining stations, we were unable to find a single sick case suitable for examination. A number of carcasses were noticed lying about on Boxvale, but decomposition had advanced too far for an examination to be made. It was estimated that fifty or sixty deaths had occurred out of 900 animals. So far as can be ascertained we have nothing on record showing the actual cause of death when cattle eat caterpillars. Personally, I was of opinion that it was caused by the grubs setting up a mechanical irritation of the mucous membrane of the stomach and bowels, but from information obtained at Westgrove it is now

considered that death is probably due to a poison contained in the grubs. The treatment of affected animals can only be attempted in small herds, such as those on dairy farms, where the animals are regularly handled. Daily doses of raw linseed oil (½ to 1 pint), followed every four to six hours with 1 quart of linseed or oatmeal gruel, the white of two eggs, and 2 oz. of sweet spirits of nitre, were reported to have been successful in several cases.

The prevention of the pest appears to be an entomological question, and was therefore referred to the Government Entomologist. At present owners of large herds are practically helpless, and can only remove their cattle from paddock to paddock, according to the development of the pest in the various paddocks. It was pointed out that ringbarking was of little service, because for each tree destroyed numerous suckers grow up, which make even greater feeding ground for the grubs.

Mr. Harding and Mr. E. C. Alexander (head stockman on Westgrove) supplied the following information:—

History.—The affection was first seen on Westgrove in 1908, when deaths were attributed to cyanide poisoning, used for killing opossums. In 1913 similar caterpillars or grubs to those now on the station were seen, and large numbers of animals, chiefly weaners and heifers heavy in calf, died. About ninety-eight were found dead in one small area. The grubs are chiefly noticed in wet seasons, and do not disappear until warm weather sets in. Trees attacked by grubs are confined to the narrow-leaf ironbark, silver or broad leaf ironbark, young spotted gum, box, and small currajong.

Symptoms.—Animals appear dull, and exhibit the following brain symptoms:—Will readily charge, have peculiar gait, quivering of the muscles, die without struggling, and sickness only noticed for about two days.

Post Mortem.—The blood is very dark in colour, connective tissue is dark, and putrefaction present at time of death, particularly around neck. Lungs are enlarged and pale in colour, pleura easily detached. Stomach contains blackish-coloured fluid, but the mucous membranes are normal in colour, petechial spots on the peritoneum. The liver in some cases is enlarged and dark in colour, with an appearance when cut into as if it had been pin-pricked. The gall is normal.

A full report dealing with the particular grub referred to has been issued by the Government Entomologist.

Supposed Gidyea Poisoning.

It was reported in May last by Inspector Comiskey, of Urandangie, that cattle were dying in that district, apparently from eating gidyea. Losses generally occur when the trees are in pod and when green feed is scarce. The pods, after falling to the ground, are readily eaten by cattle, hence the suspicion that they are the cause of the trouble. After rain, when grass and herbage are available, deaths are not noted, although the pods appear to be as plentiful as previously. It was stated that cattle were dying when the report was submitted, but that no pods were on the trees, and, owing to the dry season, green feed was not available. The inspector, after investigating the cause of death for some weeks, was of opinion that it was due to the cattle eating the green leaves, especially those of the very young or stunted shrub-like gidyea, which was then plentiful. In 1919 feeding experiments were carried out at Roxburgh, with pods and leaves of the mature gidyea, with negative results. At the same time cattle were dying, probably from eating the new leaves of the young or stunted gidyea.

Contagious Abortion.

This disease has existed in the State for many years, but, according to official reports, not to any great extent. Although much has been written concerning this affection, and numerous experiments have been carried out for many years in various parts of the world, it appears from latest reports that much has yet to be learned, more particularly with regard to the best methods of elimination and control. A living vaccine is now used successfully in affected herds in various parts of the world. It has been suggested that animals are immune to the disease only whilst they carry in their system the living abortion bacilli. Therefore, to control the disease by this method all the breeding herd would have to be vaccinated annually for at least two or three years. The bull should not be allowed to animals for at least two months after their vaccination, by which time immunity takes place before pregnancy occurs. Contrary to previous ideas, recent research work indicates that the bull is seldom responsible for the spread of the disease. By means of the agglutination test, which, however, is not absolutely infallible, it is possible to detect infected animals which carry the organism, but few farmers are prepared to divide and maintain their herds in two distinct lots—viz., infected and non-infected animals. Further, it would involve the employment of special

attendants and the exercise of isolation precautions. Whilst thoroughly appreciating the serious financial loss entailed by an occurrence of this disease in a dairy herd, and the necessity for the most strenuous endeavour to limit its spread, there is still one phase of the subject that must be borne in mind: Statistics prove, in so far as they are available, that the majority of affected cows acquire a measure of immunity, and that only a small percentage become sterile. Many cows abort only once, others frequently do so a second time, but seldom on a third occasion. By this means the very great susceptibility to fresh infestation is greatly reduced, and cows carry their calves the full period. Thus it appears that in a herd where the disease has become established the majority of cows are only what may be termed as clinically affected for a relatively short period. If all the cows were simultaneously affected, within a period of two years the majority would be immune and the breeding again normal, with the exception of the small percentage which had become sterile. But as under natural conditions all cows in a herd are not simultaneously affected, the disease gradually spreads, and some years may elapse before the herd generally has acquired immunity.

The advisability of slaughtering all affected animals has been suggested, but in view of the information detailed above such action would appear unnecessarily drastic, and if carried into effect would needlessly deplete the dairy herds of the country, as well as entail serious financial loss, with no guarantee that the disease would be exterminated.

Tuberculosis.

During the year under review the tuberculin test was applied to 381 animals, as compared with 280 in 1921 and 160 in 1920. The number of positive reactions was 30, whilst 10 were doubtful and will be retested. Of the animals tested 130 were owned by Government departments, 212 privately owned, and 39 were subjected to the test prior to exportation.

The advantage to dairymen and other cattle-owners of application of the test free of any cost is gradually being appreciated. Many owners now realise that, apart from the public health point of view, it is most unprofitable to keep diseased animals running with healthy stock; but there are others who, through gross ignorance, will not voluntarily free their herds from this most infectious and insidious disease. It is intended to as far as possible utilise the services of the Veterinary Staff for the inspection of dairy cows supplying milk to our larger cities. At the present time, unless owners make application for the test to be applied, only suspected animals are tested. Some years ago it was suggested that dairymen who maintained their dairy herds free from tuberculosis by regular tests carried out by Government veterinary surgeons should be allowed some distinguishing mark on their milk carts, or perhaps a special coloured cart, which the public could easily recognise. It is considered that the general public would fully appreciate milk with a Government guarantee of freedom from this disease. If a few dairymen adopted this scheme, it is anticipated that it would be ultimately adopted by many others. Householders and others who may require milk for sick people, and more particularly for young children, would certainly prefer the guaranteed milk, even at a slightly increased cost.

Swine Fever.

Early in March one of the metropolitan meat inspectors reported that he had found lesions of swine fever in some pigs from the Boonah District, and his diagnosis was confirmed by the Veterinary Staff. The consignment consisted of twenty-nine pigs purchased from some nine different owners. Six carcasses revealed the typical lesions. An Order in Council was issued providing for the quarantine of all pigs within a radius of 12 miles from the Boonah Post Office. Although every effort was made to trace the source of infestation by thorough periodical inspections of pigs in the area, no definite information in that connection could be ascertained. As no further sickness was reported, the quarantine was lifted at the end of June.

Sheep.

The general health of the sheep has been good. For the last six months, owing to the drought conditions prevailing, parasitic diseases, such as the stomach-worm, tapeworm, and the blowfly pest, have not been seriously in evidence. With regard to the latter, it can now safely be said that important results have been obtained after years of experiments with various dipping mixtures and dressings. A simple, safe, and economical formula has proved very effective, which consists of 7 lb. of arsenic, 2 lb. soda ash, boiled in 100 gallons of water. This mixture is jetted into

the breech of the sheep at from 100 to 200 lb. pressure. The pressure varies according to the amount of wool on the animal. As females are attacked in the majority of cases, the treatment gives protection for about three months, at a cost of about one-fifth of a penny per head. Sheepowners may be assured that their ewes can be carried over the lambing period without the great losses, both of lambs and ewes, they have experienced in the past. Of course, other parts of the body are attacked, but it can be confidently stated that 90 per cent. of the attacks are in the breech. Experiments are now being carried out at Dalmally in the direction of finding a process or specific to protect the whole body. Another feature of jetting with arsenic is that a jetted sheep is a first-rate fly trap, in that enormous numbers of flies are killed.

Reports in regard to the nasal fly have been received from various districts. It is regretted that little can be done to ward off attack in view of the limited knowledge available. This pest, which is seldom responsible for the death of animals, lowers their vitality and makes them a prey to other parasites.

The Slaughtering Act of 1898.

The volume of slaughtering for human consumption has considerably increased during the year, as will be seen on perusal of the folowing comparative figures, compiled from the returns of permanent officers of the Department. The returns of police officers in country centres are not included:—

	1920-1921	1921-1922.
Bullocks	62,570 ..	79,268
Cows	15,605 ..	24,848
Calves	21,345 ..	27,018
Sheep	377,820 ..	465,731
Pigs	17,325 ..	21,977

In addition, 164,825 pigs were slaughtered at the various bacon factories. This increase has created a great deal of additional work for all inspectors, so much so that it is necessary to detail another officer for the metropolitan area. Many persons entering the trade required considerable information from inspectors concerning the erection and renovation of shops and slaughter-yards. Inspectors have been successful in their efforts to impress many of those who enter the business with the necessity for the equipment of their buildings in accordance with the standard required by the regulations. The low price of cattle has created a keen competition amongst the butchers, and in many instances stockowners have been compelled by force of circumstances to commence operations on their own account to clear off some of their surplus stock, and quite a number have purchased established businesses at a high cost. At the same time, owing to the low price of stock, illegal slaughtering has been prevalent in almost every district. Several flagrant breaches of the Act have been investigated, but few prosecutions instituted owing to the difficulty experienced in securing sufficient evidence to convict.

The annual return, supplied to the Government Statistician, of stock slaughtered up to the 31st December last in the Brisbane District, including Sandgate, North Pine, Wynnum, Manly, Cleveland, and Redland Bay, indicates the increase in the volume of consumption in that district, due mainly to the increased population and the low price of meat:—

Cattle slaughtered	46,809
Calves slaughtered	25,072
Sheep slaughtered	318,070
Pigs slaughtered	5,902

Returns of stock slaughtered for human consumption are now regularly received from police officers in 198 country centres, which show the following totals:—

Bullocks slaughtered	60,542
Cows slaughtered	28,648
Calves slaughtered	6,651
Sheep slaughtered	110,799
Pigs slaughtered	11,082

FRUIT FLY INVESTIGATIONS.

The Minister for Agriculture and Stock (Honourable W. N. Gillies) has made available the following Progress Report, No. 8, for the months of December-January, 1922-23, of the Entomologist stationed at Stanthorpe (Mr. Hubert Jarvis).

FRUIT FLY.

The Adult Fly.

During the last two months the numerical strength of the fruit fly (*Chætodacus tryoni*) in the Granite Belt orchards has been considerably augmented. This fact is to be attributed mainly to natural increase, for, since its first occurrence therein was recorded on 17th November, 1922, there has elapsed ample time for the maturing of at least three broods of fruit flies, to carry on the work of infestation. Although undoubtedly doing much damage in certain localities, yet the fruit fly is not this season the scourge it proved itself to be last year; many orchards, in fact, showing an almost complete immunity from its attacks, and notably those orchards, the owners of which have adopted the only really satisfactory means of dealing with the pest, *i.e.*, that of the careful gathering of all infested fruit, both on the ground and on the tree also, and the effective destruction of such fruit. If every single fruit grower in the Granite Belt area would co-operate in this work of cleaning up, it would go far towards establishing a practical control of the fruit fly in that district.

Trapping the Fly—(a) Personal Tests.

Fruit fly lures, now on the local market, have not (as personal tests would indicate) so far proved of material help in controlling the pest. Experiments with these lures have been very disappointing when such lures have been placed in trees bearing fruit. The fruit fly itself, while it is on the tree, is undoubtedly the attractive agent of primary importance, from the point of view of potency.

(b) Tests by Orchardists.

Better results in fruit fly capture have been obtained by placing lures in trees from which all fruit has been gathered. One or two orchardists have reported that they have, in this manner, found "Harvey's Fruit Fly Lure" successful in trapping both the male and female of *Chætodacus tryoni* (the so-called Queensland fruit fly), one such catch extending over a period of two weeks, resulting in 200 fruit flies, of which about 60 per cent. were females. These flies were caught in the well-known Japanese glass fly-trap, the trap being suspended from a branch of the tree, and not, as is the usual practice, placed on a piece of flat board, prized between two of its branches.

Repellants.

Creasote, coal-tar, and other substances are being tried as fruit fly repellants, but with, so far, negative results.

Poison Baits.

Experiments are also being made with poison bait sprays. For many years past various soluble and insoluble poisons have been tried as a possible means of controlling fruit flies, notably *C. capitata* (the Mediterranean fruit fly of New South Wales), *R. pomonella* (the apple maggot), *Dacus-cucurbitæ* (the melon fly). These poisons, that comprise arsenate of lead, Paris green, barium chloride, potassium arsenate, &c., dissolved or suspended in water, to which is added some sweetening agent, such as sugar, honey, or molasses, are applied to the fruit trees carrying fruit as a poison bait; and it is claimed that fruit flies, in comon with other insects, are attracted to, and feed on, one or other of these "poisoned sweets," and so perish prior to depositing their eggs on the fruit. The usual method of application is by means of some form of sprayer. In practice we have found that, where a large number of trees are to be treated, a power sprayer would be an advantage; but for a smaller number of trees an ordinary garden syringe answers the purpose admirably. The point aimed at is to get about 1 pint of the poisoned liquid evenly distributed in fine droplets over, say, each tree. This can often be accomplished by shooting it into the air close to the tree, when it will fall from above: it is, however, not necessary to adhere to this method. The spray can also be applied to one or two main branches only of each tree, thus avoiding fruit and foliage injury —a very important consideration when using such poisons as arsenate of potash and arsenate of soda, both of which are more deadly fly-poisons than arsenate of lead, but have a caustic-burning effect on the leaves and fruit of the trees if applied as a foliage spray.

A fruit fly bait originated by C. W. Malley (Entomologist, Pretoria, S.A.) and used by him for some years against the citrus pest (*Ceratatis capitata*, the Mediterranean fruit fly) has, it is claimed, proved successful in controlling it. The poison entering into "Malley's Fruit Fly Remedy" is arsenate of lead, in the proportion of 3 oz. to 4 gallons of water to which is added about 2½ lb. of sugar (or less of molasses if this be used).

Experiments are now being carried out in this district in order to test the efficacy of this and various other poison bait sprays, as a possible control of the Queensland fruit fly (*Chætodacus tryoni*); various tests will also be made of several methods of application. Personally, I do not altogether favour the method of sprinkling the bait over the foliage and fruit of the trees, for the reasons above stated, and also for considerations of economy. The method now being used in Spain and Italy against the olive fruit fly (*Dacus oleae*), of applying the spray to special spray containers (Lefrontes Compagnette method), these being disposed amongst trees throughout the orchard, is proving there, and should prove here also, much more satisfactory, being undoubtedly cheaper, more deadly to the fly, and obviating all risk of foliage burning, &c. It is hoped that early next season a vigorous poisoning campaign will be in operation against the Queensland fruit fly. But this method of control, or partial control, will, as with all other measures that may be pursued, prove of little worth without the active co-operation of every orchardist in its adoption. The necessity for concerted action in the fight against the fruit fly is, I believe, realised by a large proportion of the growers: it has, in fact, already brought forth much fruit, inasmuch as there is now a persistent effort on the part of the majority to clean—from the ground and from the trees—all fruit harbouring fruit fly maggots, and thereupon to effectively destroy it.

Fruit Fly in Grapes.

On 20th January, 1923, Inspector F. Becker brought to our office specimens of Black Hamburg grapes, harbouring fruit fly maggots; these grapes were taken from a vine growing at Rivertree, New South Wales. The maggots in question have since given rise to the mature insect—*Chætodacus tryoni*. There is no record to date of fruit fly occurring in grapes in the Granite Belt area, although this association is met with exceptionally in areas nearer the coast.

The "cleaning up" work now being carried out adjacent to our south-east border in New South Wales should prove of much benefit, not only to ourselves, but also to our neighbours resident there.

Parasites.

The fruit fly parasite (*Diachasma tryoni*) introduced by me into this district in March, 1922, has not so far been recovered, and it is proposed to secure a further supply of it from Brisbane in the near future.

A still more important parasite is, I think, the Chalcid wasp (*Syntosmosphyrum tedeva*, Silvestri). This little wasp, a parasite of the Mediterranean fruit fly, attacks the maggot in the fruit, tracking it to the end of its burrow, and according to Newman (Entomologist, West Australia), laying as many as 12 eggs in each maggot; he also states that the insect is very prolific laying upwards of 200 eggs. Should it be possible to introduce and acclimatise this little wasp in the Granite Belt orchards, it ought—on this being realised—to prove a control measure of importance, and an effort to bring about this introduction should—I think—be made.

OTHER INJURIOUS INSECTS.

Wood-boring Weevil—Orthorhinus cylindrirostris.

Grape vine cuttings harbouring the larvæ or grubs of the elephant weevil (*Orthorhinus cylindrirostris*) were brought to this office. This weevil is quite well known as a minor pest of Citrus, and other economic plants in Queensland, and it has even been recorded boring through lead pipes (City Electric Light Co., Brisbane). The larva is a stout, fleshy, white grub, armed with strong sharp mandibles. When fully grown is measures just over ½ an inch in length. This is, to my knowledge, the first record of its attacking the grape vine in the Stanthorpe area. It is, however, an isolated case, and it does not appear that it will prove a pest of this plant of any significance. The beetle is quite well known to everyone: it has a long snout or trunk (hence its common name "Elephant beetle"), its front legs are very much longer than the others, and it has a habit of flying into rooms at night, attracted by lights.

Tomato Fly.

The maggots of this little shining green fly (*Lonchea splendida*) are often to be found now in ripe tomatoes, and being mistaken, under these circumstances, for the maggots of the fruit fly, *C. tryoni*, cause a great deal of alarm. This alarm is, however, unnecessary, the fly in question never (to my knowledge) injuring *sound* tomatoes, or any fruit. Its habit is to lay its eggs in some crack or injury present in the fruit, the surface of which has broken, or in overripe fruit. Its preference for injured tomatoes has earned it its name of "Tomato fly." It has also been bred by me from cucumbers and from melons. So far, I have no record of the Queensland fruit fly (*C. tryoni*) attacking tomatoes.

Tussock Moth—Orgvia postica, Liparidæ.

The caterpillars of this moth are causing a good deal of trouble in some orchards and private gardens by devouring the leaves of apple and plum trees, and also, too, the foliage of cultivated shrubs. The young larvæ, soon after being newly hatched, are about ¼-inch long, dark-brown in colour, and clothed with short hairs. They are gregarious (feeding together), connecting themselves to the leaves of the plant with fine silken threads. They grow to a length of about 1¼ inches, and are then curiously tufted with little bunches of long hairs; the two tufts at the end of the body being much longer than the others. The male moth measures about ¾ of an inch across the expanded wings, it is a smoky?brown colour, and remarkable for its comb-like antennæ. The female moth would ordinarily scarcely be taken for a moth at all, being wingless and merely a sack of eggs. It may sometimes be found crawling on the branches of the trees. The caterpillars being voracious leaf feeders should be fairly easily controlled with the ordinary codling moth arsenate of lead spray, *i.e.*, about ½ oz. arsenate to 20 gallons of water.

FUNGUS DISEASES.

(1) Apple Bitter Rot.

Specimens exhibiting this disease were forwarded to Mr. H. Tryon, Government Entomologist and Plant Pathologist, illustrating two instances of occurrence. He reports on them as follows:—

"I received in Brisbane yesterday (1st February) two apples (Rokewood var.) forwarded through Mr. H. Jarvis, Entomologist, as manifesting a disease giving him some concern so far as relates to the trees of the variety exhibiting it. This fruit affection of the apple is well known to me, the conspicuous sunken roundish dark blotches of decay, with little raised points disposed in concentric rings within them, being a very characteristic feature. It is a malady that is termed 'Bitter rot,' and one by no means confined to the variety on which it has occurred. It is, moreover, caused by a fungus named *Glœosporium fructigenum* in its present stage of growth in the fruit, and that in its final stage is named *Glomerella*—the latter being the resting one. It, in fact, not only occurs as a fruit disease as the specimens indicate, but also manifests itself, or may do, as a bark canker. These cankers commence as rounded or oblong sooty-black sunken spots, from one to several inches long, and presenting more or less ragged edges. These may occur in wood up to 3 inches in diameter; and ultimately the entire bark comprised in them is killed, as also the cambium and still deeper tissue beneath, with resulting fissuring lengthwise on the branch and tranverse cracks. Beneath some of the loose outer bark thus brought about an almost black encrustation may occur, and in minute cavities in this are found the fruiting organs, and spores of the *Glomerella*. With regard to the diseased fruit the little raised points are composed of innumerable massed oblong fungus spores, that, adhering together (*Glœosporium*—sticky spore), form a highly infective material, more potent than are the spores in the bark form of the fungus—*Glomerella*. Not only so, but the fungus long persists upon the apples or their drying up, and becoming mummified, and whether they remain on the tree or fall to the ground. However, the more permanent life of the parasite is in association with the bark. And thus, not only do apples become affected one from another by spores washed off by rain from diseased spots on to sound areas, but the apples may infect the bark (the cankers generally developing near where diseased fruit has been attached), and so the cankers, in which the fungus overwinters, originate fruit disease when the time arrives in its growth for infection to take place. In the case of fruit, the fungus attack commonly follows mechanical or other injury.

A consideration of these facts will suggest a line of treatment that obviously can only be of a preventative nature, such as the following:—

1. Remove from the trees all apples showing bitter rot, so also remove all mummified fruit on which it has occurred, and similarly gather all from the ground and burn the lot.

2. Similarly cut off and burn cankered wood or remove it with a scraper, painting Bordeaux mixture on the wound. The upper parts of the trees are where these generally occur.

3. Spray with Bordeaux mixture (4 lb. fresh lime, 4 lb. copper sulphate (bluestone), 40 gallons water) just before the buds open, and then from time to time until the fruit is full-grown or even commencing to ripen. (Note.—Arsenate of lead may be added to the Bordeaux mixture when treatment for codling moth has also to be prosecuted.) Care should be taken lest the Bordeaux mixture contain an excess of bluestone or rather any undecomposed, using a 10 per cent. solution of potassium ferrocyanide (yellow prussiate of potash) as a test in ascertaining its presence, if any.''

(2) Brown Rot—Monilea fructigena.

This fungus trouble affecting stone fruits is causing serious loss in the Granite Belt orchards, nor is the seriousness of the position fully realised by orchardists, who are unwittingly spreading the disease by allowing diseased fruit to remain on the trees and on the ground. It is quite common to see mummified fruit on the trees all through last autumn and winter, thus carrying the disease over to the next season. Under favourable (moist) conditions brown rot increases very rapidly, spreading destructively from tree to tree, and soon ruining almost the entire crop of peaches or plums. Energetic measures should be taken to control this disease, which attacks not only the fruit but the wood of the tree also. A late winter spray of bluestone (copper sulphate) and water used at a strength of about 2½ lb. to 40 gallons followed by a further spray in the spring before the blossoms open with Bordeaux mixture, 5:6:40 will probably be found helpful. It is important to destroy, by burning, all fruit and wood found to be affected with this serious disease.

FIELD WORK.

Visits of inspection to various parts of the district and experimental work in the orchards have, necessarily, during the last two months taken up a good deal of time. The insectary supplied by the Department is now completed, and will prove invaluable for carrying out under natural conditions many experiments hitherto impossible—or almost so—in the laboratory.

OFFICE WORK.

Numerous callers, letters, and general office-work have also, as in the past, claimed considerable time each week. It is anticipated that, as the fruit season closes, it will be possible to devote more time to insect life-history work, bearing on noteworthy pests, affecting deciduous fruit trees, or possibly vegetables.

QUEENSLAND TREES.

By C. T. WHITE, F.L.S., Government Botanist and W. D. FRANCIS, Assistant Botanist.

SOUTHERN GHITTOE (*Halfordia drupifera*).

This tree grows to a large size in the rain forests (scrubs) of the MacPherson Range, Blackall Range, and Imbil. Smaller trees or shrubs of the same species are often found growing in the sandy soils adjacent to beaches in places such as Southport and Coolangatta. The bark on the larger trees is somewhat wrinkled and inclined to be finely scaly. It is grey or yellowish in colour, and when cut is pale brown or yellow. The timber is yellowish-brown and very hard and heavy. It is extensively used now for making fishing-rod tips, as it is tough and fairly flexible. The North Queensland species, *Halfordia scleroxyla*, which is known as ''Ghittoe'' or kerosene wood, is very closely allied to the Southern tree, and upon investigation the two trees may prove to belong to one species, as the differences, if any, between them are slight. The larger Southern trees attain a height of about 100 feet and a barrel diameter of over 2 feet.

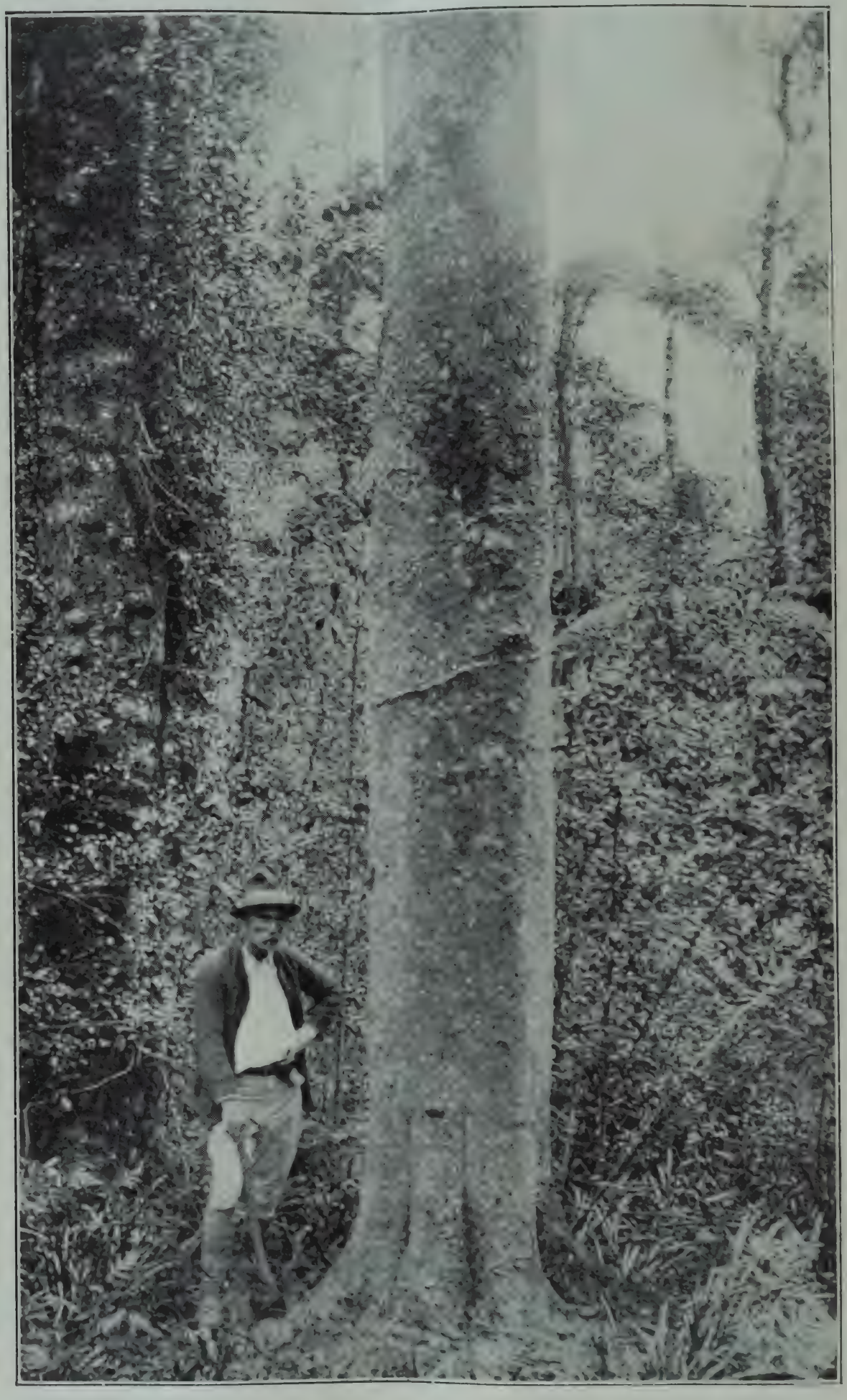
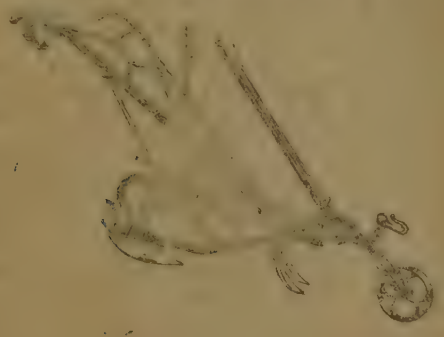


Photo. by the Authors.]

PLATE 43.—SOUTHERN GHITTOE (*Halfordia drupifera*).
A tree on Roberts Plateau, National Park, McPherson Range.

International Cultivators



The International No. 55 Scuffler is a handy little implement for use where crops are planted in rows. It is a 5-tooth cultivator and can be equipped with a wide variety of points. It is regularly equipped with expanding lever, gauge wheel, and slide depth regulator, which is used to assist the gauge wheel in keeping the shovels at the proper depth.

The International Stiff Tooth Corn Cultivator has been devised to meet the need of the grower who wishes to cultivate his ground as it should be done. The frame is built high and wide to clear the tall stalks without breaking them. There are no projections to catch and tear the leaves. The depth of cultivation is controlled by one lever and the teeth are kept at a depth set by pressure springs at the rear of the gangs. Poor cultivation will leave weeds in the rows to sap the vitality of the growing crop. You can prevent this condition and increase your yield by using an International cultivator. The International stiff tooth cultivator can also be used to equal advantage in cane or cotton crops. It has a 6-foot tread and a clearance of 31 inches.

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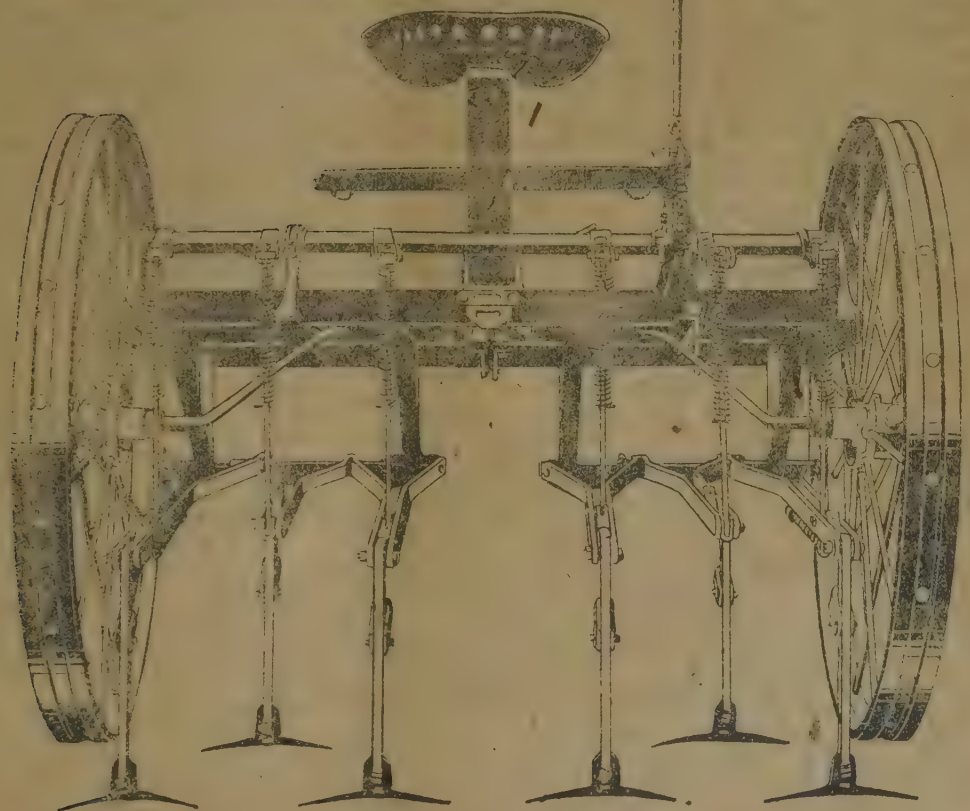

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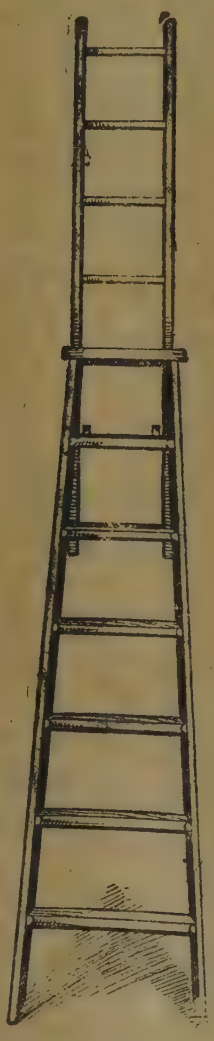

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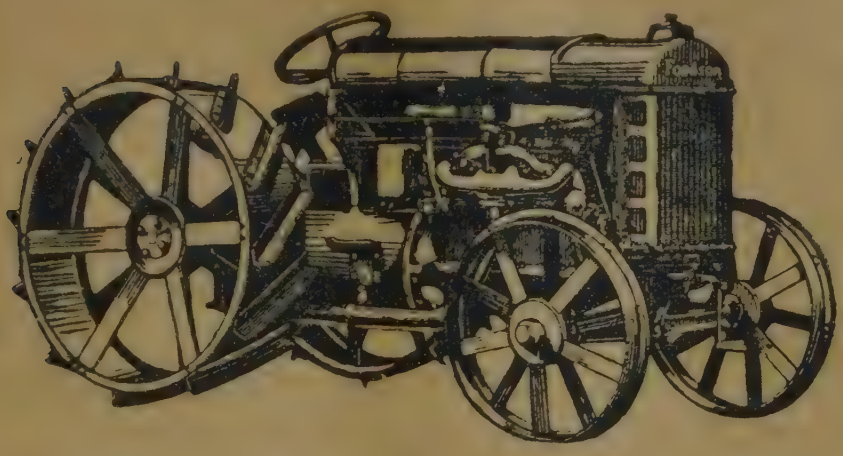

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Plate 44.—Southern Ghittoe.

Photo: Dept. Agriculture and Stock.]

NOTES ON THE QUEENSLAND SUGAR INDUSTRY.

By H. T. EASTERBY, Director of Sugar Experiment Stations.

The cane sugar industry in Queensland, like many others, commenced on an insignificant scale early in the history of the then colony.

In 1849, proposals were made for the formation of a sugar company in South Brisbane, and there is said to have been a small plantation at Eagle Farm, on the Brisbane River, but apparently no sugar was made. Sugar-cane was cultivated in the gardens of several people in Brisbane about this time, and a considerable amount was also grown in the Government Botanic Gardens.

The first sugar made in Queensland of which there is any official record was manufactured by Mr. John Buhot in 1862. In 1863, Captain Louis Hope had 20 acres under cane on Ormiston plantation, near Brisbane, and that gentleman is generally conceded to be the father of the Queensland industry. The first sugar-cane plants were most probably imported from Java and Mauritius, and about this time the Queensland Acclimatisation Society took active steps in bringing over a large number of varieties. A tremendous impetus was given to the industry when land was made available for sugar-growing during some years by the Government, on remarkably easy terms, and in 1865 as much as 18,290 acres had been taken up for cane planting. Shipments of cane were this year also made to New South Wales farmers for planting.

The early stages of the industry were almost entirely devoted to the production of cane and the extension of land under cultivation. In 1866 so great was the demand that there was actually a scarcity of cane for planting. By the end of 1867 there were nearly 2,000 acres under cane and six mills had been erected, which between them manufactured 168 tons of sugar. There was, however, an insufficiency of mills, which caused heavy losses to the farmers, but millowners did well as they could buy cane for 4s. a ton.

Up to this time the industry had been carried on entirely in Southern Queensland, but it now began to spread to Bundaberg, Mackay, the Herbert and Johnstone rivers, and Cairns. It is in these places to-day that almost the entire output is manufactured, the extreme Southern districts making very little.

Sugar-growing continued to prosper, more land was brought under cultivation, and steam mills quickly superseded the antiquated cattle and horse-power erections. The production of sugar from 1870 to 1880 is given as follows:—1870, 2,854 tons; 1880, 15,681 tons.

During the next decade, 1881 to 1890, the production of sugar in tons varied from 16,660 to 68,924; and from 1891 to 1900, 51,219 to 163,734. During the period under consideration a large number of small mills were erected in most of the sugar-growing areas of the State as well as many large factories. On the decline of prices owing to the stimulation of bounty-fed sugar in Europe most of the small mills went under. During this time also a number of modern mills were erected under the Sugar Works Guarantee Acts with capital found by the Queensland Government. These were known as "Central Mills" and led to a further reduction in the small privately-owned mills. In 1901, there were some sixty sugar-mills in existence in Queensland.

From 1863 to the advent of federation in 1901, the sugar industry was almost entirely carried on by labour from the South Sea Islands. This class of labour, while eminently serviceable and of great use in opening up the country, was always distasteful to the majority of Australians, and when federation took place steps were taken to make the industry entirely a "white" one. This was accomplished by passing a measure prohibiting Kanakas entering Australia after 1904, and providing for the deportation of those who had already been engaged within a certain period. This only left some 2,000 Kanakas in Queensland, the majority of whom had resided for years in the State and had married. About the same time the Federal Excise Act came into operation, which provided for a protective duty of £6 per ton on all foreign sugar. An Excise duty was collected on sugar manufactured in Australia and a rebate was given to that in which white labour was used. These Acts have since been repealed. The years that have elapsed since federation have seen a further decrease of the small, uneconomic mill and a general increase in the efficiency and management of the larger surviving mills. This has been followed by the growing of better varieties of cane by the farmer and a general improvement in the tonnage of cane and sugar per acre by improved methods of cultivation. At the end of 1922 the number of sugar-mills was forty-two. This includes three new large and thoroughly up-to-date mills erected since 1913—viz., Inkerman, Babinda, and South Johnstone. The first of these is in the Lower Burdekin district, south of Townsville, and is the property of Messrs. Drysdale Brothers. The Babinda and South Johnstone mills have been erected by the Queensland Government to develop the rich tropical lands south of Cairns.

Sugar is grown in Queensland from the 28th to 16th degrees of latitude, the bulk being produced within the tropics. No difficulty is experienced in securing white men to undertake the work in field and mills at the high rates of wages now paid. Although conditions are somewhat trying in the North during the last two months of the year, yet the men are healthy, the death rate is low, and sunstroke rare. The general standard of the health of school children is considered good, and epidemics are stated by medical men to be attended by a lower mortality than in the Southern portion of Australia, and that with proper care the probability of children in the North living to adult ages is greater than in the Southern portion of Australia. It is considered that most prevalent cases of tropical complaints are preventable.

Sugar-cane belongs to the graminaceæ or grasses. Its botanical name is "*Saccharum officinarum*" but it is sometimes called "*Arundo saccharifera.*" It is considered by botanists that all the cultivated varieties belong to one species; but there are said to be strong reasons for the belief that there are more than one species.

These have been divided as follows:—

1. The kind known as "*Saccharum officinarum.*"
2. "*Saccharum violaceum,*" being canes with violet leaves of which we apparently had an example in this country in a cane introduced from New Guinea by Mr. H. Tryon, known as N.G. 64.
3. "*Saccharum sinese,*" Chinese cane. Stubbs says the chief specific difference is said to reside in the disposition of its panicle, which, unlike that of the "*Saccharaum officinarum,*" is oval and ornamental. Other divisions have also been made by botanists.

Varieties of cane naturally embrace slight to extreme variations. The variation between the two principal varieties grown in Queensland—viz., Badila and Demerara 1135—is shown in the following brief descriptions.

Badila or New Guinea 15.

A dark-purple to black-coloured cane. Stout sticks, with pronounced white waxy rings at nodes. Internodes usually 2 to 3 inches long but sometimes longer, especially in ratoon cane. Habit erect; foliage also somewhat erect and very green. Eyes generally full and prominent; trashes easily; sparse arrower. The foliage of very young cane has a slight reddish tinge; flesh white and highly saccharine; a remarkably heavy cane weighing 1 lb. per foot. Greatly appreciated by labourers, as it is so easily cut, trashed, and loaded.

Demerara 1135.

A brownish-red cane of moderate stoutness and a strong ratooner. Erect in habit, so that it is eminently suited for close planting. Joints about 4 inches long, parallel-sided. Foliage rather light in colour, sparse and upright. Arrows freely in the North.

From the beginning of the cultivation of the cane in Queensland it is estimated that quite 1,000 different varieties of cane have been introduced, while several thousand seedlings have also been raised. The number of varieties in commercial use to-day, however, may be stated to be about forty-five, but by far the greatest amount of cane grown consists of the two varieties, Badila and D. 1135, mentioned above. The former is the favourite on Northern cane areas, the latter in the South.

The chemical analyses of these two varieties, from a milling point of view, are as follows:—

Variety.	° Brix.	Sucrose in Juice.	Purity of Juice.	% Fibre.	% Commercial Cane Sugar.
Badila ..	23·0	21·96	95·47	9·62	18·20
D.1133 ..	19·47	18·06	92·70	11·00	14·50

Sugar-cane grows as high as 10 to 15 feet, but stalks as long as 27 feet have been measured. Some varieties are erect in habit, as are the two just mentioned, while others incline to "lodge" or assume a recumbent position when heavy, or they may be blown over by high winds. The roots are fibrous and lateral, and the majority of varieties are comparatively shallow rooters, but some are known as "deep-rooting" canes.

Photo: Dept. Agriculture and Stock.]

PLATE 45.—LOCOMOTIVE ON RUSSELL RIVER BRIDGE, BABINDA.

The stalk is cylindrical and is composed of what are known as "nodes" and "internodes." The nodes carry what are termed the "eyes" of the cane placed on alternate sides, and it is from these "eyes" that the cane is generally propagated. The leaves are alternate and opposite, and vary in length and width. The Badila cane has large, semi drooping foliage, while the foliage of D.1135 is narrow and erect. The leaves clasp the stalk for some inches and then recede and when mature fall off, forming what is known in the canefields as "trash." When the cane plant is mature it throws up what is termed an "arrow" which develops a panicle of flowers. Within recent years the true seed of the cane plant has been discovered in the panicle, and the canes that have been grown from this seed are termed "seedlings." Cane does not arrow universally in Queensland; it does so far more frequently in the North than in the South, and there appears no doubt that climatic influences play a large part in the matter.

If a cane stalk be examined there will be found at the node several rows of dots. These produce the roots when that portion of the cane is planted in the ground.

In addition to the varieties introduced from other countries, a large number of seedlings grown from the actual seed in the cane have been raised by the Queensland Acclimatisation Society, the Colonial Sugar Refining Company, and the Bureau of Sugar Experiment Stations. As is usual in seedling work, few of these are of commercial value, but the seedlings that are successful compensate for the large number that have to be discarded.

Soils.

The land in Queensland used for growing sugar is included in a long, narrow coastal belt which is not continuous. Those parts which are suitable are separated from each other, often by considerable tracts of non-sugar producing country. The latter, owing to deficient rainfall or poorness of soil, are not utilised for cane. The sugar belt in Queensland is included between latitudes 16 deg. and 28 deg. South, but the bulk of the output is produced from Mackay north.

Cane soils vary considerably in character and composition. Cane as a plant demands an abundant supply of moisture, and so requires retentive soils. The open red porous soils of volcanic origin require frequent falls of rain to produce good crops of cane, and this, unfortunately, does not always take place in the rich soils of the Woongarra and Isis scrubs in the Bundaberg and Childers districts. The following classification of Queensland cane soils was made by Maxwell, a former Director of the Sugar Experiment Stations:—

District.	Soils.
Cairns	Partly shaly, sterile soils, but in the main deep, alluvial, sandy loams; also rich, red volcanic soils.
Mackay	Shaly in parts, with better alluvial over the lower levels; mixed volcanic and rich siliceous alluvial.
Bundaberg ..	Rich alluvial delta soils, interspersed with sterile soils and deep, rich, red volcanic soils.

The bulk of the sugar soils can be stated to be from good to rich alluvial, such as river flats and the deep red volcanic soils of considerable depth. The nature of the country is generally designated "scrub" and "forest." The North Queensland scrubs are really jungles, carrying a thick growth of what is known as scrub timber, such as silky oak, bean, pender, kauri, milkwoods, Johnstone River hardwood, interlaced with lawyer vine and other creeping plants, while the stinging tree is also conspicuous. Forest country usually consists of ironbark, bloodwood, Moreton Bay ash, bluegum, poplar-gum, and acacia.

Weather Conditions.

Hot, humid conditions are the best for the sugar-cane plant, and, fortunately, these generally obtain during the period of the maximum growth of the crop in Queensland. The wet season is usually synonymous with the three hot summer months of January, February, and March.

Although the weather is hot and humid during this period, the higher temperatures experienced in the drier belts of Australia are not common. A temperature of 100 degrees is rarely recorded. It is unusual for the thermometer to show much

above 90 degrees, even in the middle of summer. Indeed, during times of heavy rain, the weather becomes comparatively cool, but as soon as the sun reappears, the atmosphere becomes steamy and the growth of the cane is vigorously promoted.

On the coast of Queensland, where sugar is grown, the greatest rainfalls occur where the mountain ranges come close into the coast. Where they are considerably distant, as at Bundaberg and Ayr, the lowest precipitations take place. Consequently, the greatest amount of rain falls at Babinda and Innisfail, where the lofty ranges of Bartle Frere and Bellenden Ker are not far from the seaboard.

The following table shows the average annual rainfall in each of the sugar districts:—

District.	Average Annual Rainfall in Inches and Hundredths.	District.	Average Annual Rainfall in Inches and Hundredths.
Mossman	82·91	Proserpine	76·96
Cairns	90·49	Mackay	68·52
Mulgrave	81·91	Bundaberg	44·40
Babinda	165·00	Gin Gin	37·71
Innisfail	149·20	Childers	42·07
Ingham	80·53	Maryborough	46·14
Halifax	89·17	Pialba	38·04
Ayr	44·48	Nambour	60·93
Bowen	40·60	Beenleigh	48·87

Humidity

The mean relative humidity or percentage of moisture in the air is a most important factor in the growth of cane. The table hereunder gives the percentage of relative humidity in the principal coastal towns in the sugar districts at 9 a.m.:—

Place.	Percentage of Humidity.	Place.	Percentage of Humidity.
Bundaberg	69·0	Innisfail	80·0
Mackay	75·0	Cairns	70·2
Ayr	68·0		

Irrigation.

The climatic variations in Queensland from year to year are often so great that canegrowing is only certain in those districts possessing a high average rainfall. Districts with an average rainfall of 50 inches and under suffer exceedingly during dry spells, and irrigation would prove highly payable in such localities.

At the present time the only canegrowing district that uses irrigation water to any extent is the Lower Burdekin, situated some 40 to 50 miles south of Townsville. On the north side of the Burdekin River irrigation has been practised for a number of years, the plants used being the property of the farmers. Water is found at shallow depths, and is easily obtainable by sinking spearheads. On the south side of the river the Government have installed a complete system, which is available to growers of cane. Wells have been sunk and the pumps are electrically driven from a central power-house.

The cost of applying irrigation water on the Lower Burdekin is comparatively high, even though the most economical method is used. Consequently, there is a tendency to do with as little of it as possible, and, in many instances, to postpone the application if rain appears probable. This frequently leads to the suffering of the crop should rain fail to fall and the irrigation has not been carried out.

Water is not applied scientifically to cane crops on the Lower Burdekin, so that the greatest efficiency is not secured. This, however, is largely due to the high cost of application. The method of irrigation is to run the water in shallow furrows between the cane drills, usually made with the disc harrow known as the Cotton King Cultivator. The water is generally conveyed by fluming to the main ditch running on the headland at right angles to the cane rows. The water is then admitted to the channels between the cane, but as no attempt has been made to grade the land a great deal of water is often wasted.

In Hawaii the water is usually applied directly in the furrow or drill in which the cane plants are growing. The preparation of the land is more expensive, as it is laid out for irrigation according to the land contour, and the drills are cut into short sections so as to secure an even distribution. This method secures the largest economy of water. In the Queensland system, as practised at Ayr, it is not generally possible to evenly distribute the water over all the land, consequently some of the area goes short while other parts obtain too much. This system, therefore, involves the greatest waste of water, but is the cheaper as far as actual application is concerned. This is, of course, a vital point in the cultivation of cane in Queensland, where the costs of labour are so high. It is usual to only make one or two, or at most three, applications of water on the Lower Burdekin, but these are large in volume, running up to 6 inches.

In Hawaii, on the contrary, the applications are smaller, but far more frequent, ranging from the equivalent of half-an-inch of rainfall per week to 3 inches or more, as the crop makes greater demands upon the soil. These irrigations are carried on until the crop nearly reaches maturity; they are then stopped, so that the absence of water may have the effect of ripening the cane crop. With such a system the application of manures can be carried out in the most satisfactory manner, and the combined use of water and fertilisers renders the cane crops of Hawaii the heaviest in the world, while the production of sugar per acre is also higher than elsewhere.

As irrigation for cane must eventually play a large part in sugar production in the drier cane areas of the State, the matter will ultimately have to be taken in hand, so that the water may be applied in the most economical way, and no doubt the Hawaiian system, which has proved so successful, will be tried. It is a noteworthy fact that much larger crops can be grown with irrigation properly applied in dry areas than on lands where the rainfall is plentiful.

General.

During the past twenty years a great improvement has taken place in mill work, and the co-efficient of work and recovery of sugar is now much more satisfactory although there is still room for better work. The average tons of cane required to make a ton of sugar has dropped from 9.20 in the decade 1899 to 1908 to 8.68 in the decade 1909 to 1918, while in 1915, owing to the high density of the cane caused by a dry season, it fell to 8.2 and 7.76 in 1919.

The growing of sugar-cane in Queensland compares favourably with other countries when it is remembered that with slight exceptions it is carried on by a large body of small farmers (about 4,600) who do not possess the necessary capital to develop their farms in the same manner that the large millers of Hawaii and Java can do, with the added advantage in the latter island of remarkably cheap labour.

In Queensland, in favourable seasons in the North, 50 to 70-ton crops of plant cane are common, but the average is pulled down by the want of proper cultivation and fertilising in some instances, drought and frosts in Southern sugar districts, and the ratoon crops. The cane per acre of recent years has averaged about 18 tons, which is higher than it was some time ago. The varieties of cane in Queensland are, as a whole, better than in either Java or Hawaii, as they are higher in sugar percentage. Mill work in the best factories in Queensland is quite as good as elsewhere, but a number of mills require bringing up to date and their efficiency should be increased. This, at the present time, is a difficult matter, due to high price of materials.

Due to the recent awards made by the Arbitration Court in Queensland, the sugar industry in that State is probably the highest paid agricultural industry in the world. Australia is the only country in the globe that is attempting to grow cane sugar with white labour.

Apart from its great economical value, however, the sugar industry in Queensland possesses a far higher importance. In 1911, a Royal Commission on the industry was appointed by the Federal Government. This body sat for upwards of twelve months and collected a wealth of evidence in all parts of Australia, and its report was finally handed in at the end of 1912. It stated emphatically that the Queensland sugar industry was one of national importance, the maintenance of which vitally affected every citizen of the Commonwealth. By no other means at present visible can our vast Northern littoral be peopled and defended, and for this reason alone, apart from its enormous economic importance, it deserved the utmost encouragement and support that our Federal and State Legislatures can give it. The Commission have put this view in the strongest terms when they say—

"The problem of the sugar industry to-day is not, save in subordinate respects, a problem of industry, of wealth, or of production; it is primarily and essentially a problem of settlement and defence. No nation can afford to regard lightly the development of its industries, the progress of its wealth, or the economic efficiency of

its productive machinery. But, important as these things undoubtedly are, they rank, as regards the sugar industry, on an inferior plane. The Commonwealth to-day is brought face to face with one of the greatest problems that has ever taxed the ingenuity of statesmanship—that of the settlement of tropical and semi-tropical areas by a white population living under standard conditions of life. And intimately associated with this problem is the question of national defence.

"If the ideal of a White Australia is to become an enduring actuality, some means must be discovered of establishing industries within the tropical regions. So long as these regions are unoccupied they are an invitation to invasion as well as a source of strategic weakness. Granted so much, it follows that the supreme justification for the protection of the sugar industry is the part that the industry has contributed, and will, as we hope, continue to contribute to the problems of the settlement and defence of the Northern portion of the Australian continent. The recognition of the nature of this supreme justification is the first condition of a sound public policy in relation to the sugar industry. Relatively to it all other issues are of minor importance."

CANE PEST COMBAT AND CONTROL.

The Director of the Bureau of Sugar Experiment Stations has received from the Entomologist at Meringa, Mr. E. Jarvis, the following report, under date 14th February, 1923:—

Mortality Among Cane Beetles.

It will be of interest to record that a natural check of more or less severity on the increase of our grey-back cockchafer has been experienced this season as a result of the late spell of dry weather that marked the closing months of 1922. When the cultivation of plantations was resumed during the end of December many cane-growers ploughed up quantities of dead beetles that had been unable to escape from the dry soil. These specimens were probably the offspring of those which emerged at the beginning of November, 1921, the grubs from which—having pupated at an early date (July to August)—produced beetles in their subterranean pupal cells during September last. These specimens would not be able to remain alive underground in dry soil longer than about ten weeks, and consequently must have perished in December, before the dry spell broke up. However, grey-back beetles, as mentioned last month, have appeared in formidable numbers this season; those on the feeding trees at present being no doubt the offspring of specimens which emerged towards the end of December, 1921. If the first rain during this present season had fallen six weeks earlier (beginning of November), we should probably have had a very heavy emergence of grey-back beetles.

Breeding of Scarabæid Grubs.

Incidentally, while studying the imago condition of *albohirtum, frenchi,* and other cane beetles, attention this season is being given also to a few related species of root-eating scarabæidæ, the life-cycle of which has never yet been worked out. Although *Anoplostethus lætus* or *Calloodes atkinsoni,* for example, are not at present of economic importance, the grubs of these species may quite possibly at some future date make their appearance in cultivated land, or even gradually acquire a liking for roots of sugar-cane.

Para-dichlor. Experiments at Greenhills.

On the 17th instant a plot of Badila cane (August planting) measuring 66 feet by 264 feet was treated with ¼-ounce injections of this fumigant, placed 7 inches deep, 1 foot apart, and from 4 to 6 inches from the stools. The work was done with special metal hand-injectors, invented by the writer for the purpose of administering this compound in dry crystalline form, and which were found to meet present requirements—viz., a simple way of burying the fumigant uniformly in a reasonable space of time—pending the subsequent invention of more rapid hand or machine appliances, which, however, would not be needed unless para-dichlor realises expectations by proving an efficient fumigant.

It may be of interest to mention that the men who were injecting at Greenhills carried the crude crystals in an open 1-gallon tin, suspended at waist level by a strap passing over the shoulder. An occasional whiff from the openly-exposed fumigant gave them no inconvenience, being, in fact, rather pleasant than otherwise; and, moreover, owing to the method of application employed, they had no need to handle the crystals. Since reporting last month on the fall in price of para-dichlor,

to £4 per cwt., the Director has advised me that in all probability a crude form of this compound may be obtainable in the near future at a still lower price—viz., £56 10s. per ton.

Beetles on Feeding Trees (mostly of female sex).

Erroneous ideas with regard to the proportion between the sexes of our so-called grey-back cockchafer (*Lepidoderma albohirtum*) appear to prevail among cane-growers in the Gordonvale district. In order to obtain further reliable data on this question, 86 beetles were collected on the 19th January from fig-trees close to the laboratory, and when examined the results were—55 females, 31 males. Upon dissecting 50 of these females the development of eggs in the ovarian tubes were found to be as follows:—No., 17 beetles, no sign of eggs; No., 2 beetles, eggs had grown to $\frac{1}{8}$ natural size; No., 8 beetles, $\frac{1}{4}$ natural size; No., 4, $\frac{1}{5}$; No., 1, $\frac{1}{3}$; No., 8, $\frac{1}{2}$; No., 1, $\frac{4}{5}$; No., 1, $\frac{2}{3}$; No., 1, $\frac{5}{8}$; No., 3, $\frac{3}{4}$; No., 4 beetles, eggs natural size and fit for exclusion. On the 22nd January an additional 137 grey-back beetles were collected from feeding-trees close to the laboratory, and upon examination we found that 87 of these were females and 50 males. The above data indicates conclusively that collecting beetles from the feeding-trees adjoining headlands of canefields can be profitably carried out throughout the month following any big emergence of these cane beetles.

Tachinid Parasites of Cane Beetles.

An interesting experiment was undertaken this month to determine the percentage of grey-back beetles attacked by Tachinid flies whilst resting in feeding-trees during the day. On the 10th and 11th January 200 specimens were collected at random from trees near the laboratory, and each beetle placed in a cage of moist soil. Up to date (27th January) we have found 31 per cent. of these specimens to harbour dipterous parasites, in one case six Tachinid flies having been obtained from a single beetle. This parasite, which was first bred by us at Gordonvale in 1915, and slightly exceeds a-quarter of an inch in length, resembles in size and general form the common house-fly (*Musca domestica* L.), but is light brownish-yellow in colour, mottled irregularly with pale shades of buff on the thorax and hind edges of abdominal segments. The eyes during lifetime are conspicuous bright red, this colour, however, fading completely to brown an hour or two after death. Other species of Tachinidæ are expected to emerge a few weeks later, and full results in this connection will be reported next month.

Experiments with Aromas for Attracting Cane Beetles.

The possibilities of this fascinating method of control have been discussed by the present writer from time to time in various monthly reports, our first attempts in this direction having been made about eight years ago at Gordonvale Laboratory ("Queensland Agricultural Journal," vol. v., p. 169). As stated last month, evidence of positive chemotropism in *Lepidiota frenchi* Blackb. was obtained last month, details of such occurrence being as follows:—Whilst engaged in putting aromas in various bait traps hung to stakes placed about 200 feet apart on open forest country, the beetles of *frenchi* happened to commence their usual evening flight, which invariably takes place just before the advent of twilight. I was carrying at the time a tray of small bottles, some containing different aromas, while others had been emptied, although a drop or two still lingered around the mouth of these or on the corks, when suddenly, without warning, a dozen or more *frenchi* beetles flew on to the tray, buzzed about the bottles, and even alighted on my fingers, which previously had been wetted whilst pouring solution into traps already set. Although remaining on the tray for about a-quarter of a minute only, this was long enough to indicate that something had attracted them in the first instance. Possibly the movement of the tray as I walked may have caused them to fly off. The aroma in question was perhaps a combination of several different odours arising from the assortment of bottles on the tray, but was probably of a fugitive nature, since no further reaction of these beetles was noticed that evening. Subsequent exposures of aromas on the 1st January afforded additional encouragement, as *frenchi* beetles were found in four of the traps. In one case two females had been attracted, while another trap, containing water in which two chemical ingredients had been dissolved, had caught four beetles, all of the male sex.

The flighting season of the beetles is almost over here, although aromas are still being exposed at Riverstone, where the grey-backs are more in evidence. Up to the present (31st January) nearly 100 different aromas have been tried, but none of these have, so far, proved decidedly attractive to adults of *albohirtum*. However, we hope to be more fully equipped for this work next season.

At the present time we are making a special critical examination of the reproductive organs in both sexes of *albohirtum*, which, when studied from a bio-chemical standpoint may afford very material assistance in an investigation of this nature.

SUGAR CROP PROSPECTS.

The Director of Sugar Experiment Stations (Mr. H. T. Easterby), after visiting the Bundaberg and Mackay sugar districts early in February, stated that the continued absence of any regular wet season was giving rise to much uneasiness among farmers generally. Although good rains had fallen in both districts earlier in the year, these had not been followed up with further rains, and the cane, while looking well on the whole, had not made the growth usual at this time of the year. A good deal of the cane in the Bundaberg district was backward and some of it had a distinct yellow appearance. At Bingera the cane was more uniform and had a better appearance than immediately around Bundaberg. The cane on the Sugar Experiment Station at Bundaberg was also well forward.

In the Mackay district the cane was not as far forward as usual at this time of year, although there were some fine patches of cane visible of good growth and colour, there were other areas of some size that were not so well advanced and of a more or less yellow tinge. This appears in many instances to be due to faulty cultivation, and a sufficient endeavour has not been made to conserve moisture by providing a soil mulch with the scarifier. Far too much work has been done with the plough in the young cane, with the result that the capillary tubes in the soil have not been broken, but have been leading moisture to the air, whereby it is dissipated instead of conserved. No doubt farmers expected the wet season would have set in ere now, and its postponement is becoming a matter of some anxiety.

At the Mackay Experiment Station the cane is well forward, but some difficulty has been experienced this year with the green manure crops, owing to the presence of a small grub similar to that which affects the garden bean. This is the first time green manure crops have been so much destroyed as to render them useless for the purpose for which they were planted. These drawbacks appear to exist in the area immediately around the station, but have not been met with in the outside districts.

SUGAR: FIELD REPORTS.

The Director of the Bureau of Sugar Experiment Stations has received the following report (5th February, 1923) from the Southern Field Assistant, Mr. J. C. Murray:—

Woongarra.

The cane in this area now looks remarkably well. Ultimate successful results, however, depend on what rain the farmers receive during the next two months, so that it is much too early as yet to forecast a successful crop or otherwise.

Growers on the whole have their holdings clean, but it will be necessary to persevere as long as a cultivator can be worked in the cane. Shahjahanpur No. 10, M.187, M.1900 Seedling, N.813, and H.Q.285 are all making satisfactory progress. The first-mentioned is showing a remarkably vigorous growth, and, owing to its hardihood under dry weather and frost, should commend itself increasingly to men on medium soils that are inclined to be cold in winter.

Hambledon Queensland 285 is another cane that is giving satisfaction. It is a quick grower and early maturer, although displaying no outstanding resistance to frost like the Shahjahanpur.

Planters are now trying most of the standard fertilisers, but in their own interests they are advised before using them extensively to obtain information from the Sugar Experiment Station as to what results the particular fertiliser would probably give, stating whether their soil is typical of the Woongarra Scrub loams or otherwise; also, as recommended several times previously, to have analyses of soils made for them by the Bureau. Many hundreds of farmers have had this latter work carried out for them with extremely beneficial results. Fertilising is an important phase of sugar-cane culture, so caution should always be exercised in acting upon assurances given by unqualified persons.

Barolin.

The cane on this area also looks well, but the foregoing remarks on the probable Moongarra tonnage also apply here. Cane varieties making growth and presenting a generally healthy appearance are Q.882, Q.813, M.189 (Black Innis), Shahjahanpur No. 10, Malagache, M.1900 Seedling, C.S.R.3, E.K.1, H.Q.285, M.89, C.S.R.4, Q.1098, Q.813. Of these varieties, it is probable that Q.813 and E.K.1 are looking the best, particularly Q.813. Malagache could also be mentioned as having a very pleasing appearance at present. This variety on the whole is a fairly early maturing cane

and showing considerable immunity to the attack of fungoid parasites and bacterial disease. Cane on the Barolin areas appears to be particularly free from disease this year, although discoloration of the leaf frequently appears. Many people confuse this with "striped leaf disease," but with the exception of very tolerant varieties "striped leaf disease" soon develops marked secondary symptoms which materially affect the growth of the cane and leave little doubt as to the nature of the malady.

Bingera.

Cane growth and the crop prospects equal those of Moongarra and Barolin. The farms, generally speaking, look very well, and the owners are hard at work cultivating and preparing for the autumn planting. Some difficulty may be experienced this year in getting sufficient cane plants, as there appears to be more or less a shortage all round.

Cane varieties at present looking well are Q.813, E.K.1, E.K.2, M.189, H.Q.285, D.1135, and M.1900 Seedling. The growers are recommended to experiment with Shahjahanpur No. 10, especially on the forest soils.

The successful results obtained by the plantation management in the use of molasses on ratoons are worthy of comment. About 200 acres have been treated, and the appearance of the cane leaves no room for doubt as to the benefit of the treatment.

Sharon.

There has been an adequate supply of rain in this locality for the present, and the cane looks correspondingly well. Much of this country is a good forest loam, with patches of scrub soil. On the scrub land, the cane probably looks as well as any in the Bundaberg localities. Good crops are showing on the forest soils, also, the ratoons on both classes of soil appear particularly vigorous. A cane that is showing exceptionally fine growth here is the Q.813. Other canes pleasing the growers are E.K.28, E.K.2, M.1900 Seedling, and D.1135. The farmers are recommended to experiment with H.Q.285.

Grubs appear in small numbers, also white ants make minor attacks; but, taking matters altogether, no appreciable loss is occurring. Bonedust as a general fertiliser should give results on these soils, with light dressings of sulphate of ammonia on ratoons in suitable weathers. Subsoiling should give better results than ordinary work on the forest loam at Sharon; also green manures are strongly recommended. When sterile patches occur in the fields, a simple expedient, if it is available, is to tip a load of animal manure on the patch. These sterile or partially sterile pockets occur frequently and spoil the appearance of a farm.

Bucca.

It is probable that Bucca never looked better. Everywhere the cane presents a healthy, clean, and well-tilthed appearance. Cane pests or diseases are not showing in the cane at present; but here, as elsewhere, the farmers are reminded that this satisfactory condition can only be kept up by careful selection of plants in the case of disease and good cultivation mainly in relation to pests, as this makes the cane grow stronger, and it is consequently more resistant to the ravages of borers and grubs.

In all the districts the roads are far below what they should be. Accessibility to the community centre makes life on the land much more attractive. Good roads are vital to the farmer, and, after all, not a big thing to ask for.

The Director of the Bureau of Sugar Experiment Stations has received the following report (13th February, 1923) from the Northern Field Assistant, Mr. E. H. Osborn:—

Invicta Mill, Haughton Valley.

The rainfall on this area amounted to only 39.86 inches, against an average fall of about 45 inches. The December fall of 6.48 inches came just in time, as the conditions then were extremely dry. At the time of my visit the cane was looking very fair and growing at a great rate. For the season just ended some 37,474 tons were crushed, and of this amount about 10,000 tons came from the Burdekin. Although the average c.c.s. figures were lower than last year, some very high individual results were obtained, for instance, 200 tons of 16 months' old plant, B.208, belonging to Messrs. Brooks and Sons, gave an average density of 18.40 c.c.s. Upon inquiring into arsenic experiments for grub control, it was ascertained that four or five growers are so satisfied with their results that they are still using it at the rate of 40 to 50 lb. to the acre. Local farmers have formed a Beetle Board and are now very busy collecting. Four tractors are already in use; many are on order. Tractors are also being used for pumping water.

Herbert River.

Both the local mills finished crushing in very fair time, and put through about 213,000 tons. Although rather on the light side, the season was a very good one, and no industrial trouble of any kind delayed operations. Prior to the 5.84 inches of rain that fell at the end of December, the cane was rather on the backward side, but at the time of my visit the prospects for the coming season were very good. During last year grubs caused a certain amount of damage in the area and a Beetle Board is also doing very good work collecting same. Rats also did a good deal of damage to last year's crops, but the vigorous campaign carried out by the C.S.R. Company was effective. Cultivation methods are improving vastly and a very large acreage is now under lime and green manures. The Herbert River Farmers' League are interested in a proposition to supply a good quality earth lime to growers at about £2 2s. 6d. per ton on the farms. A lime distributor can also be leased at the rate of 1s. per ton by farmers. The League is also supplying manure in large quantities, and in fact is helping the growers in every possible way. Circulars issued by the Association are printed in English and also in Italian. Steps are also being now taken by the League to connect some of the outside areas by telephone. Among the farms visited in the Ingham area was that of Mr. G. Woods (Victoria Estate). This land consists mainly of shallow clayey soil, and when taken up some thirty years ago was considered one of the poorest and wettest upon Victoria, large portions of it being under water for eight or nine months every year. The present owner, of thirty years' standing, has been yearly adding to the splendid system of tile draining, inaugurated by the C.S.R. Company. The pipes or tiles used are made by the local works and vary from 3 to 12 inches in diameter. They have had to be buried at the necessary level to drain the land and are from 1 foot to 11 feet under the ground. After traversing the various fields they empty into main headland drains varying in depth from a few feet to some 10 or 12. It was impossible to get the total length of tiling, but it certainly runs into miles, and as the price of tiles runs from 4d. per foot up to 1s. 6d. per foot for the 12-inch pipe, it is easy to compute the capital represented by the system. Just prior to my visit, some very heavy rain had fallen, but within forty-eight hours scarifying was in full swing. Without drainage weeks would have elapsed before horses could have got upon the ground. As mentioned previously, a large length of the pipes had to be deeply buried, and to cover these up and also level off some low-lying places, vast quantities of soil had to be carted from the open drains—as many as three drays were continually carting from a distance of ¼ to ½ mile for a period of over three months. With such thorough draining and good cultivation a farm with only a very few inches of poor clayey soil now has a fair quality soil of a depth of, say, 12 or 14 inches, and capable of growing very payable crops of cane. Mr. Wood ploughs with a tractor drawing a 3-disc plough and ratoons with a double mould board ratooning plough. With the latter he gets through over 4 acres per day, ratooning to a depth of 14 inches. "Bedding up" also forms portion of the work upon this farm, and the beds are graded in a beautifully uniform manner, as the crest of the bed is about 2½ feet higher than the bottom of the water furrow, and comes down very gradually; also, it can be noticed that the cane rows adjoining the water furrow are in nearly all cases superior to the other rows in growth. When it is considered that Mr. Wood has practically reclaimed this land and turned it into a property capable of yielding a couple of thousand tons of cane per annum, he is certainly deserving of great credit.

During a visit paid to Trebonne and the Stone River some very fine cane land was seen, the most noticeable being upon the farm of Messrs. Hardy and Burke, consisting mainly of deep alluvial flats. One 16-acre block of first ratoon Badila cut in October last is now over one's head and should cut at the rate of 45 tons to the acre. Nearby was a block of third ratoon with the trash left. This should run into a 20-ton crop, too. Adjoining this farm is Mr. E. D. Row's. This well-worked farm is all plant and first ratoon, giving generally about 36 tons per acre for plant and about 18 to 20 tons for ratoon. Mr. Row is very keen upon green manure, and has at present some 24 acres under peas, which look a picture. The main canes are H.Q.426, N.G.15 (Badila), H.Q.409, Goru, a small quantity of Black Innis, and canes introduced by the company, such as Nanemo, Korpi, and Oramboo, all of which grow well.

Halifax (Macnade.)

Generally speaking the cane looks very well, but hardly as forward as the Victoria supply. So far, for the month of January the rainfall here has not been equal to that at Ingham. Among the farms visited a fine block of Badila plant was noticed upon Mr. J. Evers's property. This should make a heavy crop for 1923. In this area also several new tractors were seen, but the number has not increased as rapidly here as in some of the other sugar-growing areas in the North.

Rollingstone (Townsville-Ingham Railway).

This area supplies cane to the Invicta Mill, and consists of about fourteen farms. Unfortunately, the rainfall here is rather low, only 47.93 inches being registered for last year against 71.72 inches at Ingham. Several of the growers, however, speak of using tractor power for irrigation where water can be obtained from the river. One grower in a rather large way is Mr. S. Macree. His farm is about three-quarters of a mile from Rollingstone upon the opposite side of the creek, and consists of some very fair deep alluvial soil. He will harvest cane from some 15 acres this year, but hopes to have 65 acres under for 1924. Mr. Macree uses a tractor for ploughing and also intends using it for irrigation. A great deal of work has been carried out upon this farm, such as digging central drains to carry off excess water, and filling in several hollows with scoops. A large stock of manure is being used, and some 1,500 bags of stable manure are also to be used. Further up the line a splendid patch of 10 acres of May plant (Badila and B.208) was seen upon Mr. C. Barney's property. The land consists of heavy scrub land of a very good quality, which should grow magnificent crops.

Goondi.

This mill finished a very successful crushing with a total tonnage of 91,000 tons. The coming season should, however, exceed that total, as the cane at present looks very promising. As a whole, the farms are remarkably clean and free from weeds. A very large proportion of the area is also under green manure, of which some really good crops are to be seen. A good deal of liming has also been carried out, but until the Goondi bridge is finished lime will be an expensive item to this area. Among individual crops seen, some remarkably fine first ratoon Badila cane was noticed upon the Upper Daradgee lands, notably the cane of A. S. Mellick, Joddrell, and Cook, and several others in the near vicinity. These should make very heavy crops. Upon the older lands in the Stockton area some really good third ratoons (Badila), a portion of them with the trash left on, was observed upon Mr. G. Hing's farm. This land has been well limed, green manured, and also had a fair quantity of fertilisers; the result is that the ratoons look far more like good first than third ratoons. Very few cane beetles have been noticed lately. Borers were rather bad last year, but it is to be hoped that the release of the fly by the Government Entomologist (Mr. Jarvis) will help to minimise this pest.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS FOR JANUARY, 1923.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			lb.	%	lb.	
Royal Mistress ...	Ayrshire ...	25 Nov., 1922	780	3·8	34·80	
Bellona	,, ...	30 Aug., ,,	780	3·8	34·80	
College Meadow Sweet	Friesian ...	18 Sept., ,,	810	3·5	33·00	
Lady Peggy ...	Ayrshire ...	18 Dec., ,,	810	3·1	32·40	
Pretty Maid of Harelmar	,, ...	11 Sept., ,,	870	3·5	30·60	
College Mignon ...	Jersey ..	20 Nov., ,,	600	4·3	30·00	
Confidence... ...	Ayrshire ...	13 Aug., ,,	690	3·7	29·40	
Hedges Nattie ...	Friesian ...	20 May, ,,	630	4·0	29·40	
Thyra of Myrtle-view	Ayrshire ...	22 Aug., ,,	660	3·7	28·50	
Songstress ...	,, ...	4 July, ,,	600	3·8	26·70	
Dawn of Warragaburra	Jersey ...	17 May, ,,	480	4·7	26·40	
Yarraview Snowdrop	Guernsey ...	1 Sept., ,,	450	5·0	26·40	
College La Cigale	Jersey ...	10 July, ,,	360	5·8	24·60	
Fair Lassie ...	Ayrshire ...	1 Sept., ,,	480	3·9	21·90	
Netherton Belle ...	,, ...	19 July, ,,	420	4·3	21·00	
Miss Fearless ...	,, ...	30 May, ,,	540	3·3	20·70	
Hedges Dutchmaid	Friesian ...	23 Sept., ,,	540	3·2	20·10	
College Bluebell ...	Jersey ...	22 Oct., ,,	360	4·8	20·10	
Miss Betty ...	,, ...	15 May, ,,	360	4·8	20·10	

Rainfall for the Month, 239 points.

STUD STOCK STUDIES.

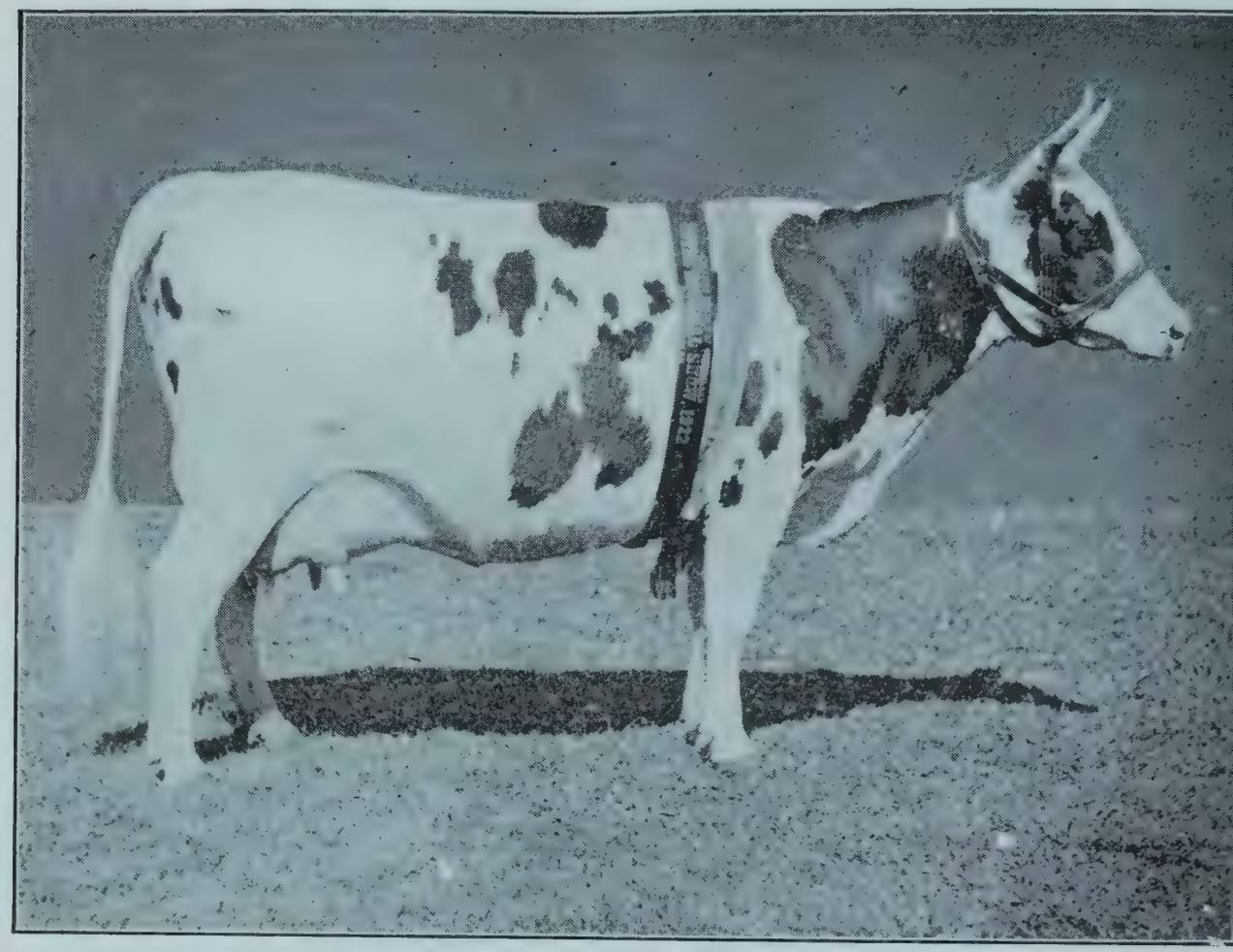

PLATE 46.—BELLE OF LONGLANDS (A.R.Q., 1818).
Champion Ayrshire Cow, Royal National Show, 1922. The property of Mr. Jonas Holmes, Longlands, Pittsworth, Q.

PLATE 47.—A FINE JERSEY TYPE—GINGER FERN OF BROOKLANDS (2470) (A.R.Q.).
The Property of Mr. W. S. Conochie, Tingoora, Q.

Plate 48.—A Typical Friesian Heifer—Maud Rooker Korndyke (imp., 589). By Tsussie Rajah, dam Minnie Rooker Tsussie. The property of Mr. F. G. Brown.

Plate 49.—A Typical Illawarra Milking Shorthorn Cow—Fuchsia of Strathdhu (431).
By Victor 2nd (27), dam Carnation. Bred by and the property of Mr. S. Mitchell, Warwick, Q.

FERTILISERS, MANURES, AND FERTILISERS ACTS.

By J. C. BRÜNNICH, Agricultural Chemist; and F. F. COLEMAN, Officer in Charge, Seeds, Fertilisers, and Stock Foods Investigation Branch.

The terms "**manure**" and "**fertiliser**" are often used interchangeably by farmers. If a distinction were made, the word "manure" should apply to natural substances, such as farmyard manure or green crops ploughed in for purposes of green manuring, and the term "fertiliser" to such artificial products as sulphate of ammonia, superphosphate, and potash salts, which each supply one chief substance required for the nutrition of plants. For the purpose of this article any substance supplying one or more elements used in the nutrition of plants will be termed "**fertiliser.**"

The value of any fertiliser depends entirely on the relative amounts of the principal constituents—**nitrogen, phosphoric acid, potash** and **lime**—contained therein.

For the protection of the farmers and fruitgrowers, Fertilisers Acts are framed, and as our Department found that "The Fertilisers Act of 1914" did not prevent the sale of inferior products, of very varying composition, as fertilisers, the powers under this Act were extended by "The Fertilisers Act Amendment Act of 1916."

The definition of "**Fertiliser**" under the combined Acts is—Any substance or compound containing, in appreciable quantity, nitrogen, phosphoric acid, potash, or lime, manufactured, produced, or prepared in any manner for fertilising the soil or supplying nutriment to plants; also any excrement of animals or any natural substance, or natural product which is used for fertilising the soil or supplying nutriment to plants. The term does not include farmyard manure, stable manure, seaweed, or crude nightsoil, but any other crude product, or offal, whether specially treated or not, is a fertiliser within the meaning of the Acts if sold for the purposes of fertilising the soil.

From this definition it will be seen that such products as **stable** and **farmyard manure, crude nightsoil, seaweed, tanyard refuse,** and **boiler ashes,** may be sold as manures, without guarantee of composition.

Every person must obtain a license as a dealer under the Acts before offering any fertiliser for sale. Any farmer or other purchaser may ask the vendor to produce his license, and buyers would do well to confine their orders to dealers licensed under the Fertilisers Acts of Queensland.

As under the present amended Act lime and crude fertilisers are included, any person desiring to sell **lime, limestone screenings, coral sand, sheep manure, bat guano,** &c., to farmers for fertilising purposes must apply for a license.

The Acts require every licensed dealer to give the buyer an **invoice certificate** and to affix to every package a plainly-printed **label.** It is of the utmost importance that the buyer, not only obtains, but keeps the invoice certificate covering each kind of fertiliser purchased.

In the case of any dispute the production of the Invoice certificate is essential, it being the seller's guarantee of the article sold, and must bear his signature.

An invoice certificate should be in the form prescribed by the Acts, and is required to set out the name of the licensed dealer, the name of the purchaser, the weight purchased, name of fertiliser, including brands or trade mark if such appear on the bags, also the chemical analysis stating the percentage of nitrogen, phosphoric acid, and potash, and the forms in which they respectively occur. In the case of bonedust, bonemeals, and meatworks fertiliser, other than dried blood, the percentage of fine and coarse material should be declared.

On all invoice certificates and labels the amounts of fertilising ingredients have to be stated in a uniform manner, as the old expressions—like bone phosphate, tricalcic phosphate, ammonia, ammonium sulphate, potassium sulphate, &c.—are liable to mislead the farmer. The Act provides for the statement of the valuable fertilising ingredients in percentage amounts of **Nitrogen** (N). **Potash** (K_2O), **Phosphoric Acid** (P_2O_5), **Lime** (CaO).

In the case of **agricultural lime** the percentage of coarse material and fine material must be stated, together with the percentage of lime as **lime carbonate** ($CaCO_3$), and in the case of gypsum the percentage of **lime sulphate** ($CaSO_4$). With burnt lime or quick lime the percentage of **calcium oxide** (CaO) must be declared.

For purposes of explanation we will suppose that W. Buyer, of Cheriton, purchases some meatworks fertiliser from A. Seller, of Summertown, a licensed dealer under the Acts. The vendor, A. Seller, must, on the sale of the fertiliser, whether paid for at the time or not, give to the buyer, at the time of sale or before delivery, an **invoice certificate** signed by the vendor setting out the required particulars. We will assume that the fertiliser in question has been found on analysis to contain 5·5 per cent. of nitrogen in the form of blood, flesh, and bone, 16·2 per cent. total phosphoric acid, and 70 per cent. of the sample is fine, 26 per cent. coarse, 4 per cent. unspecified. The vendor should give the buyer an invoice certificate in the following form:—

"THE FERTILISERS ACTS, 1914 TO 1916."

Invoice Certificate.

I, **A. Seller, Summertown,** in the State of Queensland, licensed dealer under "*The Fertilisers Acts,* 1914 *to* 1916," hereby certify that the fertiliser this day sold by me to **W. Buyer, Cheriton,** being a quantity of **3 tons 4 cwt. 2 qr. 8 lb.,** is known as **Meatworks Fertiliser,** and is marked with the figure, or trade mark, or sign following, that is to say, **M.F.B.S.**

And I also certify that such fertiliser contains the following ingredients, in the proportion of the whole, set opposite thereto, in the form hereunder:—

Nitrogen, — per centum, as sodium nitrate.
Nitrogen, — per centum, as ammonium sulphate.
Nitrogen, } per centum, as blood.
Nitrogen, **5.5** } per centum, as flesh and offal.
Nitrogen, } per centum, as bone nitrogen.
Nitrogen, — per centum, unspecified.
Phosphoric Acid, — per centum, as water soluble phosphoric acid.
Phosphoric Acid, — per centum, as citrate soluble phosphoric acid.

Phosphoric Acid, — per centum, as citrate insoluble phosphoric acid.
Phosphoric Acid, **16.2** per centum, total phosphoric acid.
Potash, — per centum, as potassium sulphate.
Potash, — per centum, as potassium chloride.
Potash, — per centum, insoluble and unspecified.

Fine material, **70** per centum.
Coarse material, **26** per centum.
Unspecified, **4** per centum.

In the case of excrement of animals or any natural substance or natural product which is used for fertilising the soil, or supplying nutriments to plants, other than stable manure, seaweed, or crude nightsoil, the average analysis is as under:—

Nitrogen, per centum. Phosphoric acid, per centum. Potash, per centum.

In the case of lime for fertilising purposes:—

(*a*) Caustic lime, or burnt lime, or quick lime—
Calcium oxide (CaO), per centum.

(*b*) Mild lime, or air-slaked lime—
Hydrate of lime ($Ca(OH)_2$), per centum.
Lime carbonate ($CaCO_3$), per centum.
} Fine material, per centum.

(*c*) Agricultural lime—
Lime carbonate ($CaCO_3$), per centum.

(*d*) Gypsum—
Lime sulphate ($CaSO_4$), per centum.
} Coarse material, per centum.

In the case of ashes, or wood ashes:—
Potash, per centum. Phosphoric acid, per centum. Lime (CaO), per centum.

Dated at **Summertown,** this **twentieth day of February,** 1923.

(Signature of dealer) **A. SELLER.**

Each bag of fertiliser sold must have attached thereto a plainly-printed **label** clearly and truly certifying—

(*a*) The number of net pounds of fertiliser in the bag;

(*b*) The figure, trade mark, or other sign under which the fertiliser is sold;

(*c*) The chemical analysis, stating the percentage of nitrogen, phosphoric acid, and potash, and the *forms* in which they respectively occur, and the percentage of fine and coarse material, &c., as required by the invoice certificate.

It will therefore be noted that the only material difference between the invoice certificate and the printed label is that in the former the total weight of the fertiliser is stated, and in the latter the *net* number of pounds in the bag to which the label is attached.

Our buyer should find on each bag of meatworks fertiliser that he purchases from the vendor, Mr. Seller, a label in the following form:—

M.F.B.S.

MEATWORKS FERTILISER.

160 lb. net.

Nitrogen .. 5.5 per cent. as blood, flesh, and bone.
Phosphoric acid 16.2 per cent. total phosphoric acid.
Fine material .. .. .. 70 per cent.
Coarse material .. .. 26 per cent.
Unspecified .. .. .. 4 per cent.

A. SELLER, Summertown.

As the printed label is an important matter to the buyer, specimens of labels for agricultural lime and a mixed fertiliser are given.

AGRICULTURAL LIME.
180 lb. net.

Lime carbonate	95 per cent.
Fine material	50 per cent.
Coarse material	50 per cent.

A. SELLER, Summertown.

CANE FERTILISER.
180 lb. net.

Nitrogen	7.2 per cent. as ammonium sulphate.
Phosphoric acid	7.0 per cent. as water soluble phosphoric acid.
Potash	7.4 per cent. as potassium sulphate.

A. SELLER, Summertown.

The **monetary manurial value** per ton has been fixed for some time under "The Profiteering Prevention Act of 1920." The **unit values,** which are the cost price of 1 per centum of the various fertilising constituents per ton, or the actual cost value of every 22·4 lb. of such constituent.

The present unit values were fixed by Prices Notifications Nos. 386 and 396, which appeared in the "Government Gazettes" of 7th October, 1922, and 4th November, 1922, and are as follows:—

The maximum price f.o.b. or f.o.r. to any buyer of any fertiliser as specified herein of half-ton lots and over shall be based on registered analysis or certified actual analysis, as under:—

	Unit Value. s.	d.
Per Unit of Nitrogen (N)—		
As Nitrate of Soda	30	0
As Ammonium Sulphate	20	0
As dried blood, or blood manure only	24	0
As bone, flesh, blood and offal, fine	24	0
As bone, flesh, blood and offal, coarse	20	0
As bone, flesh, blood and offal, unspecified	17	0
As bone, flesh, blood and offal, unspecified lumps	14	0
Per Unit of Phosphoric Acid (P_2O_5)—		
As Water Soluble in Superphosphate	8	6
As Citrate Soluble in Basic Superphosphate	8	6
As Citrate Soluble in Finely Ground Thomas Phosphate or Basic Slag	8	6
As Citrate Soluble in Finely Ground Mineral or Rock Phosphate	5	6
As Citrate Insoluble in Ground Mineral or Rock Phosphate	4	0
Unspecified	3	0
As Citrate Soluble in Finely Ground Island Phosphate and Guano	5	6
As bone, fine	5	6
As bone, Island Phosphate and Guano, coarse	4	0
As bone, Island Phosphate and Guano, unspecified and unspecified lumps	3	0

Per Unit of Potash (K_2O)—	
As Muriate	8 0
As Sulphate	9 6
Unspecified, Water Soluble	7 6
Unspecified, soluble in Hydrochloric Acid	4 3
Per Unit of Lime (CaO)—	
As Ground Carbonate (in mixtures only)	1 0
As Sulphate (in mixtures only)	1 3

DEFINITIONS.

"Fine" to signify in the case of—

(*a*) Thomas phosphate or basic slag, particles smaller than one-hundredth of an inch.

(*b*) Rock phosphates and guano phosphates, particles smaller than one-fiftieth of an inch.

(*c*) Bone, flesh, and offal, particles smaller than one-fiftieth of an inch.

"Coarse" to signify particles larger than one-fiftieth of an inch and smaller than one-tenth of an inch.

"Unspecified" to signify particles larger than one-tenth of an inch and smaller than one-half of an inch.

"Unspecified lumps" to signify particles larger than one-half inch.

The "unit value" for all fertilisers applies in an area within a radius of 10 miles from the G.P.O., Brisbane, and for all meatworks products, and guano and island phosphates, or any other natural product, to the areas in which the factory is located or the product is obtained.

For all fertilisers scheduled, the state of fineness must be declared by stating the percentage amounts of "fine," "coarse," and "unspecified" particles in the product.

For fertilisers like superphosphates, nitrate of soda, ammonium sulphate, and mixed fertilisers containing any of these fertilisers liable to destroy the bags in short periods, a rebagging charge of 13s. per ton may be allowed, if such rebagging has actually become necessary.

Mixed artificial fertilisers containing superphosphates, and ammonium sulphate or muriate of potash, or both, or for any manure other than basic superphosphate, specially mixed for trade purposes, an extra charge of £1 per ton for mixing may be made, and for basic superphosphate a special mixing charge of thirty shillings (30s.) per ton may be made.

Dealers purchasing from meatworks or bacon factories or Island Phosphate and Guano companies or any other producers, and selling from stock, may charge in half-ton lots or over: 10 per cent. on maximum prices fixed.

Dealers and producers, selling from stock, may charge in lots of 1 cwt. and over, but less than half-ton, 1s. per cwt. extra on maximum prices fixed.

For fertiliser works at and north of Mackay, on account of increased cost of labour and handling, an extra additional charge of five (5) per cent. will be allowed to be made on the calculated total cost.

CALCULATION OF COST OF FERTILISER FROM UNIT VALUES.

From the maximum prices before referred to it will be noted that the unit value of nitrogen as ammonium sulphate is 20s. per unit, water soluble phosphoric acid 8s. 6d. per unit, sulphate of potash 9s. 6d. per unit, and that £1 per ton is allowed for mixing charges. It therefore follows that the price of a **cane fertiliser,** with an analysis of 7·2 per cent. nitrogen as ammonium sulphate, 7 per cent. phosphoric acid (water soluble, and 7·4 per cent. of sulphate of potash, according to previously shown label, would cost, at Brisbane, £14 13s. 10d. per ton.

	£	*s.*	*d.*
7·2 per cent. nitrogen, as Ammonium Sulphate, at 20s.	7	4	0
7 per cent. of Phosphoric Acid, water soluble, at 8s. 6d.	2	19	6
7·4 per cent. Sulphate of Potash, at 9s. 6d.	3	10	4
Mixing charge	1	0	0
Cost per ton at Brisbane	£14	13	10

Buyers would do well to keep in mind that the Fertilisers Acts do not prescribe **standards** for fertilisers. The value of any particular brand or kind can only be calculated on the fertilising constituents guaranteed by the vendor to be present. In particular it is to be noted that, although meatworks and fertilisers of a like nature vary from time to time, they are still sold under the same brand or trade mark, and their actual value per ton may be up or down in accordance with the amount of nitrogen and phosphoric acid that they contain, as declared on the label.

It therefore follows that a buyer should first find what the seller guarantees; a low price per ton does not always mean a cheap fertiliser. The value depends entirely on the percentage of nitrogen, phosphoric acid, and potash that the goods contain. With the help of the list of present unit values, the buyer can get a good idea as to the relative merits of different brands, always taking into consideration the important factor of freight.

When the Buyer is in Doubt.

Any farmer in doubt as to the quality or any other matter concerning any fertiliser that he has purchased, should at once write to the Department of Agriculture, Brisbane.

Samples under certain conditions laid down by the Regulations under the Acts may be sent to the Department for analysis, the charge for which to a buyer, other than a dealer, is only nominal. In most cases, however, the quickest and best method of deciding any point in connection with a purchase is to write to the Department giving the following particulars:—

Name of fertiliser:	Invoice certificate and label:
Name and address of seller:	Date of delivery:
Quantity purchased:	Name and address of buyer:

All correspondence should be addressed to—

The UNDER SECRETARY,
Department of Agriculture and Stock, Brisbane.

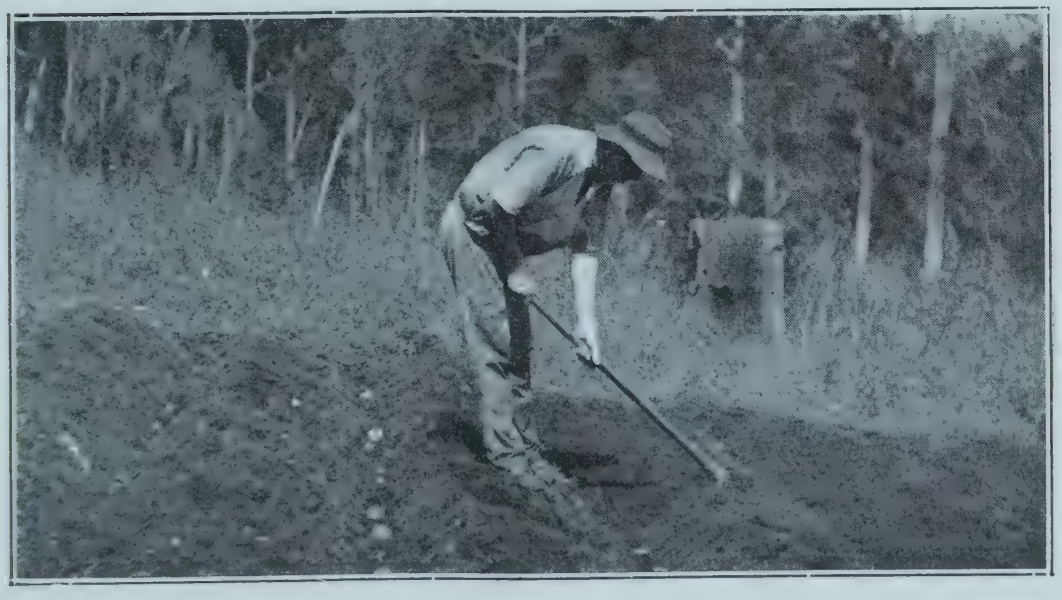

Photo: A. Blakey, Junr.]

Plate 50.—The Potato Planter.

THE COTTON WORM* *CHLORIDEA (HELIOTHIS) OBSOLETA*, SAY.

By HENRY TRYON, Entomologist.

INTRODUCTORY.

This cotton pest that the present writer described thirty-four years since as a Queensland destructive insect (vid. Tryon, H. "Insect and Fungus Pests," pp. 190-192, Brisbane, 1889) under the name *Heliothis armiger*,† and as injuriously related to the maize plant, and that was evidently one of the insects much earlier recognised but not definitely identified as an enemy to cotton in Southern Queensland, has this present season manifested its injuriousness in relation to the latter plant over a wide area.

Our earliest intimation of its perniciousness was afforded by the receipt of specimens of the caterpillars from the Toogoolawah district, forwarded therefrom on 28th December. This was soon followed by evidence of its presence in the cotton crop in the Rosewood-Dugandan area. These facts formed the occasion for a special Press report on the subject that was first printed in the "Queensland Times," Ipswich, 17th January, 1923 ("The Cotton Boll Worm—Discoveries in West Moreton"), and that, it is understood, has since been reproduced in other newspapers.

Subsequent to these latter occurrences, the same insect has been brought under our notice as seriously damaging the cotton plant as far west as Chinchilla, in Southern Queensland, in the Cooran, Kilcoy, Woolooga, and Biggenden areas, nearer the coast, and again in the important Central area (Rockhampton). It is unlikely, however, that these indications of local occurrences mark the limit of its range.

Referring to the United States of America, it has been officially stated—"Until the advent of the Mexican Cotton Boll Weevil the Boll Worm was easily the most serious of the numerous insect pests of the cotton plant"—and since already in Queensland its capabilities for occasioning serious loss of crop have been manifested, it is a pest whose presence must be regarded as being of serious significance here also.

The very great attention also that has been bestowed upon this injurious insect will appear from the fact that a bibliography relating to it "largely prepared by Mr. A. A. Girault," and including reference to the commencement of 1905 only, embraced no less than 252 titles, and many additional ones would be required to bring it up to date. This is given in "The Cotton Boll Worm," by A. L. Quaintance and C. T. Brues, Bulletin 50, Bureau of Entomology, U.S. Department of Agriculture, 1905, an elaborate technical Bulletin of 155 pages that we have largely availed ourself of in what follows.

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*This insect is quite distinct, both from the point of view of its habits and the nature and extent of its depredations, from the notorious Boll Weevil (*Anthonomus grandis*)—a beetle, and also from the Pink Boll Worm (*Pectinophora gossypiella*), a diminutive moth, both so destructive to cotton in other countries. It is an insect, on the other hand, long familiar to the Queensland farmer as harmful to maize and to the tomato.

†In this article the specific name *obsoleta*, Say, has been used for the insect, following American authority. The reasons for substituting this for *armigera*, Hübner, do not, however, appear to me very conclusive. Our cotton pest is the *Chloridea armigera*, Hübner, of Hampson. *Vide* Catalogue of the Lepidoptera Phalænæ, IV. Noctuidæ 56, p. 45, London, 1903).

DAMAGE TO COTTON.

The insect is injuriously associated with a large number of plants, some figuring in staple agricultural crops—and in Queensland, especially with Cotton, Maize, Tomatoes, Tobacco, and Peas; but its injuries to the first of these will alone now claim our attention. The fact, however, of this very general dietary is of great significance both in explaining its occurrence as a plant pest and in controlling the same. In fact, it has been stated with regard to the United States occurrence that "the injury to the cotton crop is largely by the third and fourth generations of larvæ" alone. Those of previous generations attack other plants, and in Queensland it is not the first generation caterpillars that are ordinarily associated with the damage.

(a) Injury to Foliage—

This is occasionally manifested when the plants are young and have as yet not commenced to flower; but even after defoliation the plants attacked may completely recover, especially should good growing conditions prevail.

(b) Injury to the Flower Buds or "Squares"—

This is the most serious form of injury, since the "square" attacked almost invariably falls off, even when the injury is very slight indeed. This injury takes the form of a small hole that the caterpillar gnaws into the bud, most commonly through the portion representing the unexpanded corolla; very seldom an additional one is also present. At times, when the flower bud is small, the leaves at the base of the bud (the involucre) are first passed through in gaining access to its interior. These holes may vary in size according to the age of the caterpillar, each boring during its life and growth into and feeding into, on an average, 8 to 9 squares, although a single larvæ has been known to damage as many as eighteen. Meanwhile, the worm commences exercising this peculiar habit two days after it has issued from the egg, and when only about $\frac{1}{8}$ inch in length. It continues doing this throughout its life, whether or not the plant has developed flower buds.

(c) Expanded Flower—

This again may claim the insect's attentions often to an extent that causes it to fall to pieces.

(d) The Boll—

The bolls again may be attacked. Usually, as buds, flowers, and bolls are present at the same time on a single plant, or succeed one another on any part of it, the caterpillar may bore into these, either after having served to throw down "squares" that it has attacked, or do so exclusively. When a caterpillar has entered a cotton boll, it may thenceforth confine its attention to it until it is full-fed; and not injure one boll and crawl to another to damage it in turn, as happens in the case of the "squares." Thus, when primarily attacking these the damage may be far less extensive than when the buds are principally claiming its attention. It may be added also that the injury to the cotton boll does not alone consist in the material consumed, for it also renders the admission of mould-fungi and other fungi possible, and so conduces to discoloration and decay of the lint. This secondary damage is more liable to be realised when wet weather prevails. These several injuries may bring about an almost complete loss of crop, as has already been experienced through the attacks of the boll worm in Queensland.

DESCRIPTION OF INSECT.

The caterpillar, it need scarcely be remarked, represents but one stage of four in the life-history of a moth, each of which is characterised by quite distinct outward features and habits of life. These are (*a*) egg, (*b*) larva or caterpillar, (*c*) chrysalis, and (*d*) adult insect—the moth of both sexes.

The Moth—

This is a stout-bodied insect, measuring about 18 millimetres, $\frac{2}{3}$ inch from head to tail. When settled, the front wings, that almost conceal the hind ones, form a rather wide angle with the body and slightly slope downwards at the sides. These organs when extended together attain 40·4 millimetres, the females usually being somewhat larger. These organs are usually of a general drab-colour sometimes tinted with a reddish suffusion. They have usually an indistinct brown band with a festooned inner margin within their outer (posterior) borders, and a dark discal mark, traversed by a dark line. The hind wings are whitish coloured with the veins and broad apical band almost black. The outer wing margin is also brown, the latter often with a reddish suffusion. The mid-body (thorax) is broad and densely and smoothly clothed with pale greyish-brown hair-like scales. The two sexes are very much alike, but the male has a narrower hind-body.

The Eggs—

These are white objects, apparently almost spherical, but really low dome-shaped with flattened bases. Under the lense they exhibit numerous little ribs radiating from a central spot and united by fine bar-like lines. They are rather less than 1·50 inch in breadth.

The Caterpillar—

This varies at its different stages of growth, is elongated, almost hairless, and three pairs of claw-like bearing true legs, and six pairs of abdominal and one pair of caudal (tail) foot pads (prolegs). In the condition generally observed it is pale brown above, this hue of colour being really produced by a few little longitudinal dark lines, and very pale greyish white beneath; the base and upper surface being separated by a broad yellowish-white band extending the length of the body in which the breathing pores (spiracles) are included. There is also a distinct band, usually double, along the centre of the back. A series of yellow or orange spots also occur along the sides. There are also a series of hair-bearing black points with definite arrangement. The insect usually attains ultimately a length of 42·25 millimetres (21 lines).

A. A. Girault has described six instars or distinct stages of growth, separated each by a casting of the skin (ecdyses). In the first of these succeeding the egg, the caterpillar, at first 1·5 millimetres in length, attains a length of 3·8 millimetres. In the first two of these instars the insect does not exhibit the longitudinal bands later on so conspicuous.

Chrysalis—

The chrysalis is dark-brown and smooth, and presents features in which the body-segments and the folded wings and legs (now both encased) are recognisable. The tail end of the body is elongated and terminates in two spines, one of which is larger than the other—the two almost touching. It measures about $1\frac{1}{4}$ inch in length.

HABITS OF INSECT.

Moth—

The moth flies by night—seldom by day except when disturbed. Then it moves off with suddenness and rapidity to soon alight again and run off to concealment, its colour and colour pattern assisting it then in eluding discovery when settled. Thus disturbed when upon a maize plant, it will usually seek harbourage in another growing close at hand.

It feeds upon the nectar of flowers, including those of the cotton plant itself; again, in that issuing from special glands on the leaf stalks and other part of plants not yet in flower, and also, further, on the sweet fluid excretory matters that emanate from aphides and related insects.

The female and male moths occur in about equal proportion. The full term of the lives of both male and female under natural conditions is to some extent uncertain, but when in confinement, individuals can be kept alive, exercising care, for from seventeen to thirty-eight days, as shown by Girault in the course of his experiments.

Eggs—

Each female moth may lay from 500 to 3,000 eggs, the number being apparently determined by the food secured by it. Observations elsewhere, however, have shown (fortunately) that many of these eggs do not hatch, even when not destroyed by the indwelling presence of some egg-parasite.

When about to lay, an operation that takes place usually soon after sun-down when darkness is coming on, the moth may be observed quickly vibrating its wings in nervous flight as it hovers over some cotton flower-bud, or other portion of the plant, but the while affixing its eggs one by one on the several parts of it, but especially on the former.

Girault noted at different times during a period of eleven months the habits of twenty-four female moths in depositing their eggs. He found that eleven different places were selected for this purpose, nine of which were upon the cotton plant; that, in fact, harboured all but 5 per cent. of those deposited. Also, that of the eight positions on the plant on which the eggs might occur, 28·5 per cent. of the total eggs laid were upon the flower-buds or squares; the foliage (both leaf-surfaces) and bolls being the parts that came next from the point of view of eggs received. Only a few eggs are thus laid indiscriminately here and there on an individual plant.

These facts have an important bearing, since it is only the quite young caterpillars that occur, of course, near the eggs from which they have hatched out that are accessible to practical methods of destruction.

With regard to the length of the egg-stage, the lastmentioned investigator has again shown that this may be of as brief duration as two and a-quarter days, but that, taking an entire season (in U.S.A.), may extend even to seventeen days, but is, generally speaking, nearer the lower limit—*i.e.*, from two and a-half to four days. Further, that this variation is principally governed by that of the temperature to which they are subjected.

Larva or Caterpillar—

On hatching from the egg the boll-worm caterpillar is very small, being only 1·5 mm (1-16 in.) in length, and it is only 3·8 millimetres

when it casts its first skin (first ecdysis) and is three and a-half days (about) old. It again grows during life until it is nearly 1 4-5 inch in length and is twenty-one days old.

This development is, however, reached in six different stages (instars), each separated—as is the first—by a molting of the skin and a brief interval of rest. These instars are distinguished, not only by difference in size, but also to a slight extent in general colour and pattern of markings. Thus the caterpillar at first is uniformly pale, translucent, yellowish in certain lights—greenish after feeding, with the head and a plate behind it—the back cervical shield—nearly black.

The minute caterpillar on hatching and after consuming the abandoned egg-shell soon acquires activity and wanders in search of a suitable feeding-place and food. We have found them repeatedly within the growing tips of the plants, amongst immature leaves and flower-buds, for they need tender plant-tissue for their sustenance. As we have seen, it especially seeks out the flower-buds or squares, and having found one very quickly enters within the "leaves" or parts of the involucre that covers and protects this as it develops. Then at once it gnaws a little hole usually into the upper part of the flower-bud that corresponds to the corolla, and starts feeding on the inner parts, stamens, &c., eating these out, and henceforth does the damage we have described to both squares and bolls or to one of these only.

The Chrysalis or Pupa—

When the caterpillar is "full fed" and has arrived at its limit of growth it finds its way to the ground, and soon crawls away from the main stem to a distance not exceeding two or three feet, when it commences to work its way beneath the surface, digging slantingly downwards to a depth of from one to seven inches. Then it works upwards again forming a curved tunnel, with smooth walls of well packed earth webbed together by a thin coating of silk. This brings this ascending branch of the tunnel to one-eighth or one-fourth of an inch below the surface, leaving a thin wall of earth through which the moth must penetrate on emerging. In the lower end of the tunnel, when all this work has been completed, the caterpillar transforms to a chrysalis or pupa.

This stage in the insect's life varies according to the temperature to which the pupa is subject. It may be as short as ten and a-half days, and again may be protracted when the weather is cold to twenty days with an average, say, of fourteen days; but it has been found that the moth does not generally issue at once from the ground, remaining in its cell for sometimes a day or two longer.

Other Food Plants—

Amongst the habits of the Cotton Boll Worm allusion must be made generally to the very large number of plants on which it will subsist and thrive. Messrs. Quaintance and C. T. Brues have enumerated no less than seventy of these, comprised in as many as twenty-two plant families. The principal ones, as we have seen in Queensland,

are, however, Maize, Cotton, Tomato, Tobacco, Cape Gooseberry, Peas, and several garden flowery plants—*e.g.*, Snap Dragon (Antirrhinum). In connection with its occurrence on the cotton plant, it is especially necessary to take cognizance of the exact relationship that obtains between it and the maize plant—a matter that cannot be entered upon here, but is alluded to—in a different connection—later on.

The Successive Generations—

The dates of captures of the Cotton Boll Worm Moth at large during the annual season of its activity extending for several months, and consideration of the length of a single life cycle, concur in indicating that there are several successive broods or generations of the insect each year. As far as Queensland is concerned we have no data—derived from observation—whence we can conclude what is the number of these generations. A. A. Girault and F. C. Bishopp, the entomologists who carried out the laboratory investigations in connection with the Cotton Boll Worm in Texas in 1904-5, for the United States Bureau of Entomology, have, however, given us an indirect means of estimating this number. They discovered, in fact, that there was a definite relation between atmospheric temperature and this number in the districts covered by their inquiry. Thus they were lead to assume that in each locality "the average effective temperature required for a single life-cycle within the season of the insects' activity was 1,417 deg. Fahr., that the activity in spring did not begin until the monthly mean temperature was 10 to 15 deg. Fahr., ceasing in the autumn at the same temperature." Thus it was calculated that in Florida, where the seasonal activity extended throughout the year and the total effective temperature was 11,058 deg. Fahr., the generations numbered $\frac{11}{1}\frac{5}{4}\frac{0}{17}$ deg. = 7·9; that in Texas (Paris) the corresponding figures were $\frac{6}{1}\frac{8}{4}\frac{0}{1}\frac{2}{7}$ deg. = 4·2, and that in New York, it fell to $\frac{2}{1}\frac{2}{4}\frac{1}{1}\frac{7}{7}$ deg. = 1·5. Moreover, it was discovered that the calculated number of generations (*i.e.*, 7·9, 4·2, and 1·5 and others cited) corresponded to the number of generations reported from direct observation—*e.g.*, Texas 4, Ontario, Canada, 1-2. This fact of the occurrence of successive generations during the season corresponding in time approximately to a certain succession adopted in practice in the growth of crop-plants, and the recognition of a definite life-cycle has had an important bearing in devising, as we shall see, a cultural method for Boll Worm control.

CONTROL MEASURES.

A. Non-Successful Control Measures—

(1) *Poisoning with Arsenical Salts.*—The great success in destroying another cotton caterpillar the "Army Worm" (*Alletia argillacea*), one that does not occur in Australia, by the use of Paris green, has *suggested* the feasibility of producing similar good results in the case of the Cotton Boll Worm by the application of this chemical or of arsenate of lime, or of arsenate of lead.

But with the Boll Worm (*Chloridea obsoleta*), similarly successful results are, however, not obtainable in practice, since this insect is

for the most part an internal feeder, and so is alone accessible to the poison during the two or three days after it has hatched from the egg, when it is a very small object; a fact that involves for success a very timely application of the poison, or its presence on the plant (that it is difficult to preserve) when this hatching-out takes place. And it may be remarked that when used, it is customary to apply the poison in the dust form—*i.e.*, diluted—instead of with water, with nine or ten times its *bulk* of some powder—*e.g.*, air-slaked lime, or dry but damaged flour.

As regards this question, it may be mentioned that in November, 1921, at a conference of the entomologists of the cotton States of America, at which thirty attended, this general question of the efficacy of thus poisoning the Cotton Boll Worm was fully discussed, and that the conclusion that was arrived at was generally unfavourable to its use. In fact, the Texas entomologist, R. E. MacDonald, stated that in the course of experiments greater damage (through the destruction of predatory insects) took place where arsenical dusting was adopted than where it was not, a statement that was verified by F. C. Bishopp, the entomologist of the United States Department of Agriculture, whilst another entomologist stated that it had taken eight or nine applications to put down an infestation, and that this did not pay.

(2.) *Use of Trap Lights.*—It has been conclusively shown that trap lights that may prove most useful in assisting in the control of another cotton pest of Queensland, the Cut Worm (*Agrotis*), and that also constitute the principal measure used against Cotton Cut Worms in British India, are of little or no avail in controlling the Cotton Boll Worm (*Chloridea* (*Heliothis*) *obsoleta*). When they are attracted by light, they settle on surrounding objects and are not, as are many insects, lured to their destruction. Hence, light may prove even a means of increasing their numbers—at least, locally.

B. Successful Control Measures—

(1) TRAPPING BY USE OF A TRAP CROP.—In the cotton belt of the United States it is recognised that the Boll Worm Moth, on its first appearance in the spring, does not attack the cotton-plant; and from the dates on which its injuries were reported in our cotton-growing areas the same observation applies to these also. In the former region it is not since cotton-fields are not available, but by reason of the fact that it prefers another food-plant. This favoured plant is the maize, that is usually found growing throughout the States known as cotton States. In fact, it is recognised that the insect that is termed by the maizegrower the "Corn Ear Worm" on the corn-plant drying out in the ordinary course of events, the moths that the Corn Ear Worms have yielded pass to the cotton to lay their eggs thereupon and so infest them. It is thus the third or fourth generations of insects that commence attacks on the cotton, and then only when the growing maize is failing them. And, moreover, the period in the growth of the cotton plant when this event takes place is that in which the flower-buds or "squares" especially favoured by the moth are coming into prominence.

This fact being recognised, a means of controlling the Cotton Boll Worm has been devised, consisting in raising a special growth of the maize so that it will form a trap crop. For this purpose a particular variety of maize is selected that has a rapidly maturing habit as one of its characteristics, and its sowing is so timed that (1) its specially attractive stage (*i.e.*, when it has just finished "silking," or even is a little less advanced and the "silk" is already showing), is attained at the

same time (2) that the cotton is manifesting its flower buds or "squares" and has attained its Boll Worm attractive stage also; and when these events correspond in time to that of (3) the appearance, say, of the third or fourth generation of moths (at the end of a life-cycle of thirty to thirty-five days, as commonly happens), the presence of the more favoured crop—the maize—saves the cotton from being visited by the moths, and so from being Boll Worm infested.

In the practice of this method, every 200 rows of cotton are alternated with five or six rows of maize, or small plots of maize are distributed through the cotton block.

It is further necessary that before the caterpillars, that have developed from the moth's eggs that have been laid on the silk where they are most commonly placed, have reached a stage of growth short of that when they would naturally leave the plant and enter the soil, this maize must be removed, and may be used as ensilage or stover, otherwise it will merely yield a brood of moths to attack the cotton when in boll.

It will appear from this that the successful employment of the trap crop method depends on a precise knowledge of the growth of the two plants, of the relations that subsist between these and the insects, and of the existence of some order in the progress of the season of growth—conditions difficult at present of being met in Queensland.

(2) Cotton Cultural Procedures.—1. From what we have stated regarding the habits, it is to be concluded that the moth is less addicted to laying its eggs on individual cotton bolls than on individual cotton squares, and also that if it does lay its egg upon the former much less damage will result than if it deposit in a square in the first instance, since a single caterpillar will restrict its attention to one or two bolls that provide sufficient sustenance to enable it to fully develop; whilst the same insect would pass from one "square" to another, and destroy almost a score of them or not much less.

It, therefore, follows that a measure of control of Boll Worm injury is reached by selecting a quickly maturing cotton, and by cultivating it well and following other agricultural procedures that conduce to its generous and rapid growth, so as to get it beyond its especial vulnerable stage before the moths bent on attacking it appear, and that as we have seen are furnished by other crops earlier sown, and on which the insect also breeds—maize especially, but also tomatoes, Cape gooseberries, &c.

2. Clean cultivation will materially lessen the insects available for subsequently grown cotton, both by bringing about the exposure of them (chrysalises, &c.) to the fatal influence of the sun's heat, in using the implements of tillage, and by rendering them more accessible to the attacks of soil-frequenting predatory beetles, ants, and birds.

3. The avoidance of growing cotton as a ratoon crop, and of the conditions in the field it brings about, especially conduces to a lessening in the numbers of Cotton Boll Worms.

4. For the same reason, the custom of leaving maize standing in the field long after the cobs are ripe conduces to the same harmful result as well as to the presence of other cotton-injurious insects.

(3) Parasites.—The fact of the insect having a succession of broods during the summer months, of its having—as a caterpillar—so many different food plants, especially amongst those in cultivation and

certain of which—*e.g.*, maize, cotton, tomato, &c.—are more favoured than others, and of its being almost wholly an internal feeder, renders it, as we have seen, almost impracticable to deal with this Boll Worm by the ordinary procedures used in contending with destructive insects generally and that involve the use of insecticides. So, again, the habits of the moth itself render the use of both poison-baits and trap-lights of but little avail, if any. The question under these circumstances—What about the use of parasites?—presents itself.

Now, there are several of these natural enemies of the Boll Worm, including both parasites of the egg and parasites of the larvæ (caterpillars). Thus in the United States of America several in both groups have been met with and described.

(*a*) *Egg Parasites.*—One of these (*Trichogramma pretiosa,* Riley) has been described as being "extremely abundant and of great value." This is a small Chalcidid fly, scarcely visible to the naked eye, measuring but 3-10 to 4-10 of a millimetre in length. A. A. Girault, who paid continuous attention to it and its habits during several months, states regarding it that its life-cycle is from eight to eleven days only, the shorter period corresponding to the summer months, also that there may be fifteen continuous generations during this period. Further, that during two years, 1903-4, the proportion of Boll Worm Moth eggs, from different sources, and yielded by three distinct kinds of plants that were parasitised, was practically the same—*i.e.*, rather more than 63 per cent. Further, that more than one Trichogramma fly might lay its egg in that of the Cotton Boll Worm Moth. A second egg-parasite, a Proctotrypid fly, has also been met with in the United State of America, but is evidently very rare there.

(*b*) *Larva-parasites or Caterpillar-parasites.*—These known are of two classes—hymenopterous and dipterous. Of the former (Hymenoptera) is a small, black, red-legged fly, measuring 4 millimetres (2 lines) to 4·5 millimetres ($2\frac{1}{4}$ lines) in length, a Braconid fly named *Micropolites nigripennis,* Ashm. The female of this lays a single egg in a partially grown caterpillar, and the resulting grub feeds within and upon it, working its way when full-grown outwards from a point near the head of the caterpillar, when this is only partly grown and is still passing a lingering existence. Having done so, it at once commences to spin up, forming a relatively long cocoon that remains attached to the front part of the caterpillar or to some object near to hand.

The dipterous parasites are various true flies belonging to the family Tachinidæ. Seven different parasites of this group have been bred in the United States alone from the Boll Worm Caterpillar.

(4) DISEASES.—There is again a bacterial caterpillar malady that may attack the Boll Worm Caterpillar. It is apparently identical with the disease of this nature that in Queensland is associated with the Army Worm (*Leucania unipuncta*) with such fatal results. These, however, are alone realised when the insects are numerous and the weather is wet or humid.

PARASITES IN CONTROL.—The value of these natural checks on this Cotton Boll Worm, *Chloridea obsoleta,* may be inferred from the following statement that relates to the first-mentioned class only:—

"Summarising the conclusions to be reached from a study of the insect parasites of the Boll Worm, it is evident that the destructiveness of the third and fourth generations is materially lessened by them.

During September, 1904, when the fourth generation should have been damaging much of the late cotton in Northern Texas, it was almost impossible to find any Boll Worms on cotton, and the few to be obtained in the neighbouring alfalfa fields were invariably attacked by parasites. At the same time, adult specimens of Micropolitis could almost always be collected in these locations by the use of the sweep net. Meanwhile, the late corn nearby where the parasites could not get at the larvæ was badly damaged. Such evidence plainly suggests that the dearth of larvæ on cotton at this time must have been, in a measure at least, due to the good work of parasites" (Quaintance and Brues).

There is the further significant pronouncement emanating from Hawaii:—

"The Cotton Boll Worm of the Southern States, *Heliothis obsoleta*, has not as yet been found to attack cotton here. It often infests corn, and has occasionally been bred from other plants. Its parasites are so efficient that it is not expected it will become an important factor in our cotton production (D. T. Fullaway, 1909). This latter conclusion has an added interest, since the state of things revealed is evidently one of the outcomes of the extensive transmission on the part of Albert Koebele of parasites of all classes of insects into the Hawaiian Islands from various exotic regions."

With respect to Queensland, and the noteworthy attacks on its cotton crops in many districts by the injurious insect under consideration, we have yet to learn whether insect parasites occur in association with it or not. So far, our only very limited observations have brought to light one of those mentioned, the parasite of the caterpillar itself—the Braconid fly, *Micropolites nigipennis*, or a species closely allied to it. This occurred affecting some Boll Worms obtained by an assistant, Mr. W. A. T. Summerville, near Ipswich, South Queensland.

It is desirable, therefore, that this cotton pest be further looked into from this particular standpoint. Should investigations tend to indicate that already many different kinds of parasites occur affecting the Boll Worm, we may then conclude that the severe injury to cotton is a transient event due to some natural factor prejudicially affecting their numerical development or virility. Should, on the other hand, they reveal their comparative absence, then the expediency—in what has been above stated—will suggest itself, of securing these enemies of *Chloridea obsoleta* that already occur in other countries for the behoof of our cotton-growing industry here, in thus controlling one of the principal of its insectifoes.

(5) PREDATORY INSECTS.—The insect has many predators in its own class. It would unduly extend this article to particularise here. However, it may be mentioned that the caterpillars themselves are inveterate cannibals, and that this fact alone accounts often for marked decrement in their numbers. This is a form of natural control that cannot be practically exploited however.

(6) BIRDS.—The services of birds in controlling the pest cannot be too strongly emphasised, and are most serviceable when the land is being prepared for the crop. This applies both to domestic poultry and indigenous native birds, especially magpies, crows, magpie larks, pee wits, and other ground-feeders. Their preservation should be the cotton-growers' special care.

It is a matter for consideration whether the general use in the field of well-stocked travelling poultry-houses, a procedure developed by the present writer in his schemes for subduing the "Grub" (*Scarabæid larva*) of sugar-cane in Queensland, would not prove of inestimable benefit in reducing also the soil-frequenting insects in our cotton-growing areas also—and the insect under notice is, temporarily at least, one of them.—H.T., 5-2-1923.

Description of Plates 51 and 52.

PLATE 51.—*Chloridea obsoleta*, Say (Heliothis armigera, Hübner) showing three phases in its life-history—the egg phase omitted. Also showing mode of occurrence of insect, and character of injury to Cotton plant.

PLATE 52.—The same. Showing in further detail the injurious relationship between the Caterpillar ("Worm") and the Cotton Flower—figs. 1-17; ditto Cotton flower-bud ("Square")—figs. 8-13 and 15; and ditto Cotton seed capsule ("Boll")—fig. 21; the general size of the insect as associated with the several injuries effected; and the Eggs magnified—fig. 14.

NOTE.—These Plates are reproduced from the "Fourth Report of the United States Entomological Commission," by Charles V. Riley, Ph.D., Chief, Washington, D.C., 1885.

Plate 51.—The Boll Worm (*Heliothis armigera.*)

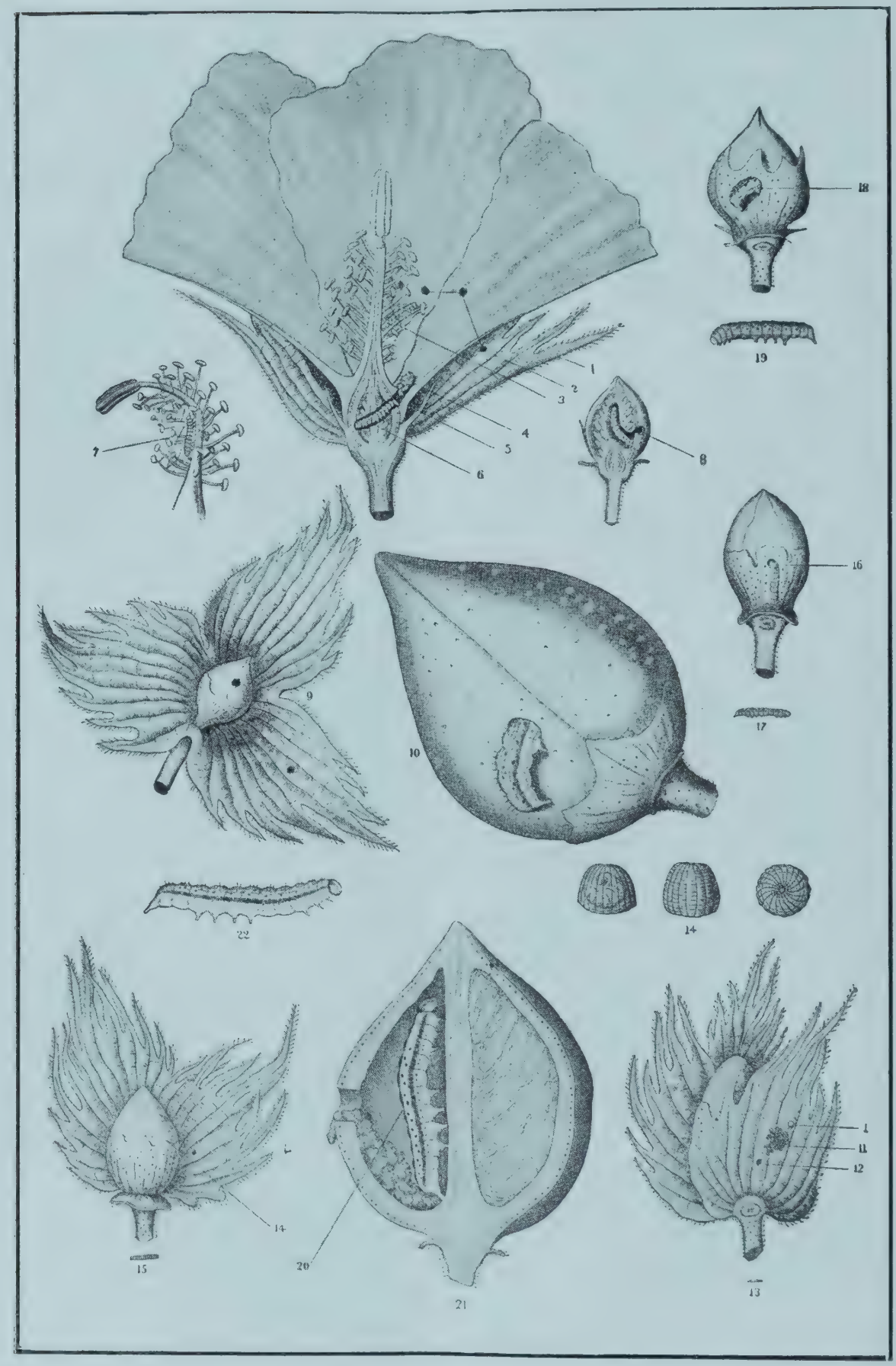

PLATE 52.—THE BOLL WORM (*Heliothis armigera.*)

THE QUEENSLAND COTTON INDUSTRY.

BY W. G. WELLS, Cotton Adviser, Department of Agriculture and Stock.

The continued dry spell might nearly be described as a blessing in disguise to the cotton industry, because it has brought out many important facts which seem to have been overlooked in the growing of last season's crop, due in a great measure to the very favourable weather conditions which then existed at the critical period in the growth of the plants. The heavy rains of December and January of last season have confused many people in the formation of their ideas regarding the cotton plant, such as the types of soil best suited to cotton culture, the time and methods of preparing the soil, when to plant, when and how to thin, and the cultivation of the soil after the plants are of sufficient height to allow of it. Owing to the rank growth secured on some of the late-planted crops on very rich soils, many of the growers formed the opinion this year that the poorer classes of soil are the most suitable for cotton-growing. This may be true in localities favoured by heavy and continuous rainfall, where it would be necessary to restrict the growth of the plants; but from observations made this year it does not seem to hold true throughout the cotton sections.

A Southern Soil Survey.

Through most of the southern district, away from the coast, the sandy loams of good fertility and high moisture-carrying possibilities, and the alluvial loams, appear to be well suited to cotton-growing. The heavier soils, while capable of producing good cotton, have been handicapped, not only from the lack of rain during the growing season, but also by the dry winter of last year. Such soils appear to require a thorough saturation of the subsoil before they are capable of carrying a cotton crop to maturity in a season like the present one. Along the coast in average seasons it is probable that the low, well-drained ridges of soils of a loamy nature will give the best results, as there may be danger of too rank a growth being obtained on the richer creek "flats" and soils of that nature during the rainy season. This danger may be overcome by planting at the proper time, and by properly spacing the plants and rows, and it is advised that any grower planting on such land should experiment with time of planting, different widths between the rows, and different distances between the plants, in order to find the proper combination for his soil.

The Soils of the Central District.

Several types of soil appear to be well adapted to cotton-growing in the Central districts, such as the softwood scrubs on both the red and brown soils, the well-drained alluvial soils, and the low ridges of loams and sandy loams. The heavy soils in this district, as in the Southern district, have remarkable moisture-carrying possibilities when the subsoil has been thoroughly wet and good mulches maintained to reduce the evaporation. A thorough mulch is highly desirable on this type of soil, due to its tendency to crack open during the drought.

The Necessity of Thorough Cultivation.

The results obtained by some of the growers this year, even under the severe weather conditions, show the necessity of thorough preparation of the seed-bed before planting. Early ploughing, followed by at least one deep cross-ploughing later on, appears to be highly beneficial, as such a system this year seems to have reduced the amount of weeds and grass and has enabled the rooting system to penetrate deeply in search of moisture, with a consequent ability on the part of the plant to withstand the drought better and also to develop a better crop of bolls containing fibre of good strength and length. Much of the land growing cotton has not been cultivated before, and a thorough æration of such soils is highly desirable, as they are often of a "sour" nature. It is recommended, wherever possible, to plough at an early date any land which is to be planted to cotton next year. This is especially true of any land being broken for the first time, as it puts the soil in shape to allow a good penetration of any rains which may fall from now on. By thoroughly harrowing after any soaking rains the moisture is conserved, so that the subsoils contain a good degree of moisture and the growths of the weeds and grass are also checked. Later on in the season this land should be cross-ploughed to a depth of at least seven inches, and then be kept in a good state of tilth until planting time. This last ploughing should be done at least a month before planting time in order to allow the soil to settle into a firm seed-bed. In several instances this season it was observed that the seed was being sowed at the time of ploughing. This system should be thoroughly condemned, as it does not allow a thorough preparation of the seed bed, and, when the seeds are dropped in the furrows, it does not allow an average depth of planting.

Seed-Bed Preparation.

Too much attention cannot be paid to the preparation of the seed-bed. The faulty methods of many of the growers of this season are in a great measure responsible for the present condition of the crop. It is true that the drought and insect pests have severely handicapped a good percentage of the crops, but in nearly every section crops have been found which have been grown under a system of thorough preparation of the seed-bed and a maintenance of a clean cultivation after planting. These crops have been badly damaged by the maize grubs in some cases, but without this damage excellent crops would have been produced, even under the droughty conditions existing this year, as is shown by the yields on crops which have escaped the grubs.

By an early and thorough preparation of the seed-bed the grower is in a position to benefit by any good rains in September and to plant during that month, which, from the results obtained this year, seems to be desirable. With a firm, deeply prepared seed-bed, with moisture in the subsoil, any cotton planted after a rain during September is in a position to develop an excellent type of stalk and fruiting system if the proper methods of thinning and cultivation are observed. Many fields of such nature were observed this season, before the December rains came on, which were well laden with bolls and squares, while the neighbouring fields, which had been prepared poorly and planted later, were suffering from lack of moisture and had only a small percentage of the crop which the older and better-prepared fields contained.

Early Planted Crops.

The argument has been advanced that there is the danger of the lower crop of bolls on the early planted crops opening during the rainy season in January, with a consequent chance of their being destroyed by the rains. It is true that along the coast and in some of the more heavy rainfall sections of the inland country there is some danger, during periods of excessive rainfall, that the first few bolls may be mildewed or destroyed by the rains, but there are other factors which should be considered. An early planted plant has a tendency to develop a better fruiting system than later-planted plants, as the fruiting system is being developed in the cooler weather when the growth of the plant is slower, and consequently more fruit is borne on such stocky-type plants than on the faster-developing more slender type of plants of the later plantings. This ability to develop an early crop is highly desirable, even if part of the lower bolls are destroyed, as the crop of bolls acts as a check on too rapid a growth of the plant during any periods of excessive rainfall, which is beneficial, not only in that a type of plant is developed which is more easily picked, but the danger is restricted of such rank growth of plant being developed that any late heavy rains might seriously damage a good portion of the lower crop, due to the inability of the sunlight to penetrate through the heavy foliage and dry out the opened bolls.

Dry Farming Methods.

The impression prevails that cotton is distinctly a dry-weather plant, but, while it resists the drought and heat much better than many agricultural crop plants, it is highly essential that sufficient moisture be obtained at the period when the bolls are developing to the extent that they are utilising a large percentage of the moisture secured by the plant. The present drought has brought out this fact very forcibly, and many of the growers have learned that the best of "dry farming" methods must be employed in order to insure a retention of sufficient moisture in the soil to develop a profitable crop.

The Effects of Close Spacing.

Last year many crops were left unthinned, and the heavy rains which fell during December and January were able to carry the plants to the maturity of a large crop in many cases. This, and the fact that some of the late-planted crops which were spaced a little too wide on very rich soils, and consequently made a very rank growth without much of a crop, led many growers to believe that close-spacing in the row, and in many cases no thinning at all, was highly desirable. Crops treated in such a manner this year are showing the evils of such a system, in that a large percentage of the bolls and flowers has shed during the last month, and that the bolls which have remained on the plant are of small size and in many cases are being forced open prematurely, with a consequent checking of the development of the strength and length of the fibres. The root system of a cotton plant is capable of spreading to only a certain degree, and in periods of drought, such as the present crop is going through, it can be easily seen that the plants should be spaced out sufficiently to allow them to secure the maximum amount of available moisture. This should not be carried out to too great an extreme, as any distance wider than this is simply reducing the amount of the crop under average seasonal conditions. This thinning should be done when the plants are small,

before the competition for the soil moisture has become so severe that the plants are partially checked.

A Difficult Problem.

The yearly fluctuations of the amount of rainfall through most of the cotton sections of Queensland are so great that it is going to be a difficult problem to secure the maximum yields of cotton which the soils may be capable of producing. With this in mind, the grower should study his methods of spacing and thinning, with the idea of producing a good average crop year after year rather than the maximum crop for every year. As is seen this year, the methods last year under good rainfall conditions are failures this year under very droughty conditions. The grower should attempt to perfect a system which will yield a paying crop under droughty conditions and still yield well under very heavy rainfall conditions. This can be accomplished only by the grower adopting the best of farming practices and then experimenting on the average of his soils until he is satisfied of having secured the best system.

Small Areas Tilled Properly Better Than Large Tracts Farmed Badly.

Too little attention has been paid to the cultivation of the crops this year. Many of the growers have had too large an acreage to handle efficiently with the amount of labour at their disposal. It will be far better, both for the grower and the future of the cotton industry in Queensland, if the grower attempts to grow only what he can take care of properly. To many, a cotton boll is just a cotton boll, and it is not realised that even if the boll does look large and well-opened it may contain short weak fibre or long strong fibre, depending on how it is grown. Plants which have been choked out by the weeds and have forced their crop open by the lack of moisture certainly cannot be expected to produce as good fibre as well-grown plants which have had sufficient moisture to develop their crop normally. If faulty methods of cultivation are going to persist, the standard of Queensland cotton cannot be kept up, even with the best of adapted varieties, unless the climatic conditions are exceptionally favourable.

An Encouraging Factor. A Promise of Profitable Yields.

The degree to which the well-grown early planted cotton has stood up this year is very encouraging indeed, and it is anticipated that, when better farming practices are adopted as a whole, the cotton crop of Queensland can be depended on as a profitable industry, even under severe drought conditions. The present crop in good condition in most sections still has sufficient time to develop a surprisingly good yield if the rains start at an early date. If the growers take advantage of these rains and prepare a thorough mulch in any of the crops which are not too high to put the scarifier through, it is anticipated that profitable yields may be secured on the late-planted as well as on the older crops.

REGULATIONS REGARDING COTTON PESTS AND DISEASES IN BRITISH COLONIES AND INDIA.*

In 1910, the Pink Boll Worm was known to exist in India, German East Africa, British West Africa, and Hawaii. In 1922, it was recognised in Egypt and the Sudan, Mesopotamia, Brazil, Peru, Mexico, the United States, and the West Indies. In fact, almost every country growing cotton had been infected with it with the exception perhaps of Turkestan, Uganda, Nyasaland, and South Africa. The spread of the pest was chiefly due to the transport of infected cotton seed often contained in bales of ginned cotton, and has necessitated legislation, which, in nearly every case, has, unfortunately, been effected rather too late to secure freedom from attack.

India—Bombay.

By "*The Destructive Insects and Pests Act of* 1914" the Governor in Council has the power of regulating or prohibiting the import of material likely to carry infection, and on the 7th November, 1917, the Governor in Council issued an order that seeds of cotton should not be imported by land or by sea, by letter or sample post; and again that cotton seed should not be imported by sea except after fumigation with carbon-bisulphide at a prescribed port.

Madras.

By "*The Madras Agricultural Pests and Destruction Act of* 1919" the Governor has directed that all Cambodia cotton plants in certain specified districts shall be pulled completely out of the ground and allowed to wither before the 1st August in

* Summarised from article in Bulletin No. 2, volume 20, page 192, of the Imperial Institute.

each year. The reason for this notification was that the stem weevil and the Pink Boll Worm were established as pests in respect to Cambodia cotton. This effect was brought about by the fact that Cambodia cotton was treated as a biennial and perennial crop, and had thus favoured the spread of the two insect pests which have now become serious. It is therefore proposed to limit the cultivation of this, as well as all other cotton, to a single year, and to arrange for a certain close time during which there will be no cotton-growing.

Burma.

The only regulation affecting cotton pests which is in operation in the country is the Government of India's notification of the 7th November, 1917, by which, under powers of Act of 1914, the Governor in Council issued a general order which is being observed in Burma at the present time, and which deals with the control of imported seed.

Bihar and Orissa.

The importation of cotton seed is controlled.

Assam.

The importation of cotton seed is controlled by regulation, but, as a matter of fact, as the inhabitants use their own seed, they do not import.

Uganda.

The Uganda Cotton Amendment Ordinance of 1920 provides for the following:—

The distribution of cotton seed for sowing purposes shall be under the sole control of the Government.

The Director of Agriculture shall have the power to requisition any cotton seed considered suitable for sowing, and such seed shall be handed over free of all costs.

Cotton seed obtained from hand cotton gins shall forthwith be destroyed unless it is to be subsequently handed over to the Government.

All cotton plants shall be uprooted and destroyed after the first season's crop has been picked, and on no account shall they be allowed to remain for a second season or for more than one year in the ground.

The Director of Agriculture may notify a date prior to which all the previous season's cotton plants must be uprooted and destroyed in any district.

This Ordinance came into force on the 1st January, 1921.

Anglo-Egyptian Sudan.

Ordinance No. 7 of 1907 has reference to locust destruction, a most important regulation where young cotton is liable to be attacked. Where locusts have deposited their eggs in cotton land, the land must be worked with a "fass" as thoroughly as possible without uprooting the plants. The penalties vary from a fine not exceeding £2 or imprisonment not exceeding thirty days, or both, to a fine of £5 or imprisonment up to two months, or both.

By the Plant Diseases Ordinance of 1911 the Governor-General is given powers to proclaim a disease, order the destruction of diseased articles, and quarantine imported plants, and co-operate with the Postal and Customs officials. The diseases proclaimed include the Pink Boll Worm.

Another order published in 1917 prohibits the transportation of cotton seed, seed cotton, cotton lint, cotton plants, and any parts thereof from the Red Sea Province into any other part of the Sudan, except under the authority of the Director of Agriculture.

A further order of 5th December, 1918, prohibits the importation of growing plants into the Sudan, but allows the entry of such plants from Egypt under stringent conditions.

The Cotton Ordinance promulgated in November, 1912, prohibits the importation of cotton seed, except under a permit granted by the Director of Agriculture. No cotton seed may be used for sowing unless it has been approved by the same authority. Cotton shall be picked clean, free from leaves, bolls, and dirt, and none but clean cotton shall be sold or offered for sale. No cotton is to remain on the land longer than the one season. By the Cotton Regulations of 1913, all cotton plants shall be destroyed in certain specified districts before the dates given in each year.

Another paragraph in the regulations compels occupiers of cultivated land in the Tokar Plain to destroy all noxious weeds and other plants likely to harbour pests on their land.

Cotton Regulations published in March, 1917, gave the Director of Agriculture permission to alter the date before which all cotton plants, stalks, bolls, or parts of plants shall be destroyed by the owner. They also regulated the removal or destruction of all waste cotton seed, &c., from a ginning factory likely to harbour the Pink Boll Worm, and made it only permissible to store cotton seed in a ginnery after the ginning has been finished for the season where the doorways, windows, and other openings are covered by wiregauze mesh which will prevent the egress of the moth of the Pink Boll Worm.

The Pink Boll Worm having been found in Tokar cotton seed, it became urgent that steps should be taken to prevent seed cotton or cotton seed grown in the Tokar district from being transported into the other districts, and great care is exercised in this matter.

Nigeria.

Under an Agricultural Ordinance promulgated in 1916 the Governor in Council may make regulations to prevent the introduction or spread of pest, for regulating the sowing, collecting, ginning, or other preparation of cotton, and for prohibiting any importation or the sowing of any particular kind of seed or specifying any particular kind of seed as the only kind to be imported or used.

An Ordinance issued in 1917 provides that all cotton seed must be imported through the port of Lagos, where, after inspection, it may be admitted, disinfected, or destroyed. In 1918, regulations were issued making it an offence to mix American with native cotton.

By a Native Court rule of the Zaria Province of October, 1916, it was made a punishable offence to plant any but Government seed, or to mix cotton grown from Government seed with native cotton. A similar rule was made in July, 1920, in respect to the Court of the Sokoto Province. These rules seem to have little to do with the prevention of pests and fungi, but are practical guarantees that the seed is free from attack and that the crop is reasonably safe.

By a Regulation of 1920 the Governor shall declare what are the American cotton areas in which no other cotton may be cultivated, and, except in such parts of certain provinces as are not declared to be American cotton areas, the owner or occupier of any land in Nigeria on which cotton or any cultivated species of Hibiscus exists shall uproot and burn all plants of either group before certain specified dates.

Gold Coast.

The importation of seed is regulated.

West Indies.

In the Leeward Islands the importation of cotton seed and seed cotton from Antigua is prohibited.

In the Virgin Islands the importation of cotton seed has been prohibited since October, 1920. By a Cotton Ordinance of 1914 cotton plants in Montserrat are not allowed to remain in the soil longer than one season. By the Cotton Stainer Ordinance of August, 1918, all cotton-growers are compelled to destroy the cotton stainer met with in or about any cotton storehouse.

By an Ordinance of 1919 the Governor in Council of Montserrat may declare a close season for cotton in that island, and the occupier of any land in the cotton district must, before the first day of the close season, burn or bury any cotton plants on that land. The planting of cotton is prohibited during the close season.

In St. Kitts and Nevis an Ordinance was passed in 1918 providing for the eradication of cotton stainer. The Governor of St. Kitts is also empowered to fix close seasons. The importation of cotton seed is prohibited, except from certain specified places.

For Antigua, during 1919 and 1920, Ordinances were issued dealing with cotton stainer, close seasons, and prohibiting the importation of seed.

In St. Vincent an Ordinance was issued in 1911 providing for the destruction of old cotton plants and preventing cotton being grown as a biennial plant. In February, 1918, an Ordinance was issued dealing with cotton planted outside the cotton season, and imposing penalties on anyone who planted at any other than the defined period. In 1917, the importation of seed cotton or cotton seed was prohibited, and the prohibition was extended to any bags or packages that had been used for cotton seed or seed cotton.

Nyasaland.

In May, 1920, an Ordinance was issued providing for the destruction of cotton bushes in order to prevent their being grown in more than one season, and which prohibited the distribution to natives of cotton seed which has not been approved by the Director of Agriculture.

Rhodesia.

Cotton seed can only be introduced under the permission of the Director of Agriculture.

Union of South Africa.

By Proclamation of 15th January, 1921, the importation of cotton seed with lint attached and cotton lint in which any cotton seeds are contained is prohibited.

Tanganyika.

Power is given to the Governor to make rules for the inspection of cotton seed and cotton plantations for the eradication of diseases and insect pests. Cotton seed can only be imported under a license obtained from the Director of Agriculture. The Director has power to requisition and distribute seed from any plantation, and no native is allowed to grow cotton from any seed which has not been approved by the Director of Agriculture. Everyone growing cotton shall give notice if he finds disease in his plantation.

No cotton plant is to remain in the ground beyond one year, and the Director of Agriculture may fix a date prior to which all the previous season's cotton plants shall be uprooted and burned. When disease is found to exist in any plantation the Director may order all the cotton plants to be burned, the plantation to be deeply tilled, and no cotton to be replanted for two years.

WEEDS OF QUEENSLAND.

By C. T. WHITE, Government Botanist.

No. 29.

SOLANUM SEAFORTHIANUM.

Description.—A rather slender perennial climbing plant, quite glabrous in all parts. Leaves 3-6 inches long, the upper part deeply 7-9 lobed, the terminal lobe the largest, the lowermost lobes usually very small, the lower part consisting of a slender petiole (stalk). Flowers of a lilac colour, borne in terminal bunches (panicles) of 2-4 inches. Calyx green with 5 short teeth. Corolla when expanded nearly 1 inch in diameter, deeply divided into 5 spreading lobes. Stamens 5, anthers bright yellow. Style slender, pale lilac colour, 4 lines long. Berries bright red (deep scarlet), globose ½ inch in diameter, borne in profusion.

Distribution.—A native of the West Indies and tropical America; of late years it has run out in several localities in Queensland. It is very abundant at Theebine and Kanyan (Wide Bay district), Atherton Tableland (North Queensland), and other places overrunning the "scrub" edges and secondary growths.

Common Name.—It is sometimes called "Deadly Nightshade," a name, however, applied in Queensland indiscriminately to a number of plants of the family *Solanaceæ*.

Botanical Name.—Solanum, derivation doubtful; *Seaforthianum,* after Lord Seaforth, who introduced the plant into English gardens in 1804.

Poisonous Properties.—A couple of years ago specimens of this plant were sent me from Springsure with the report that two children had seen the plant growing wild and had eaten some of the berries. They were later taken violently ill and were admitted to the Springsure Hospital; both recovered.

The berries are often accused of causing the death of fowls, and in this Journal for April, 1918, an account is given by H. Tryon of the deaths of fowls caused by eating the berries of this plant. (He refers to it as *S. jasminoides* and later as *S. Seaforthianum—Seaforthic* by a misprint—and from the description this latter species is evidently the one meant.)

The plant is evidently eaten freely by fruit-eating birds, as can be seen by the way it is carried from one place to another; it is possible that some birds can eat the fruit with impunity. I have heard that ducks eat them freely without ill effects following, but this needs confirmation.

Eradication.—So far it has not manifested itself as a bad weed in cultivation or pastures. It grows freely in scrub areas, and when the scrub is felled may come up thickly enough to prevent a good burn. Growing as it does also on the edges of scrubs, the bright berries are attractive to children, who might eat them with fatal results. In such situations as these spraying with an arsenical solution and later burning the plants should prove effective. It would probably have to be done several times, as additional plants come up after the burning off.

Botanical References.—Solanum Seaforthianum, Andr. Bot. Repos, p. 504; *S. prunifolium,* Willd., ex O. Sendtner in Mart. Flora Bras. X 15.

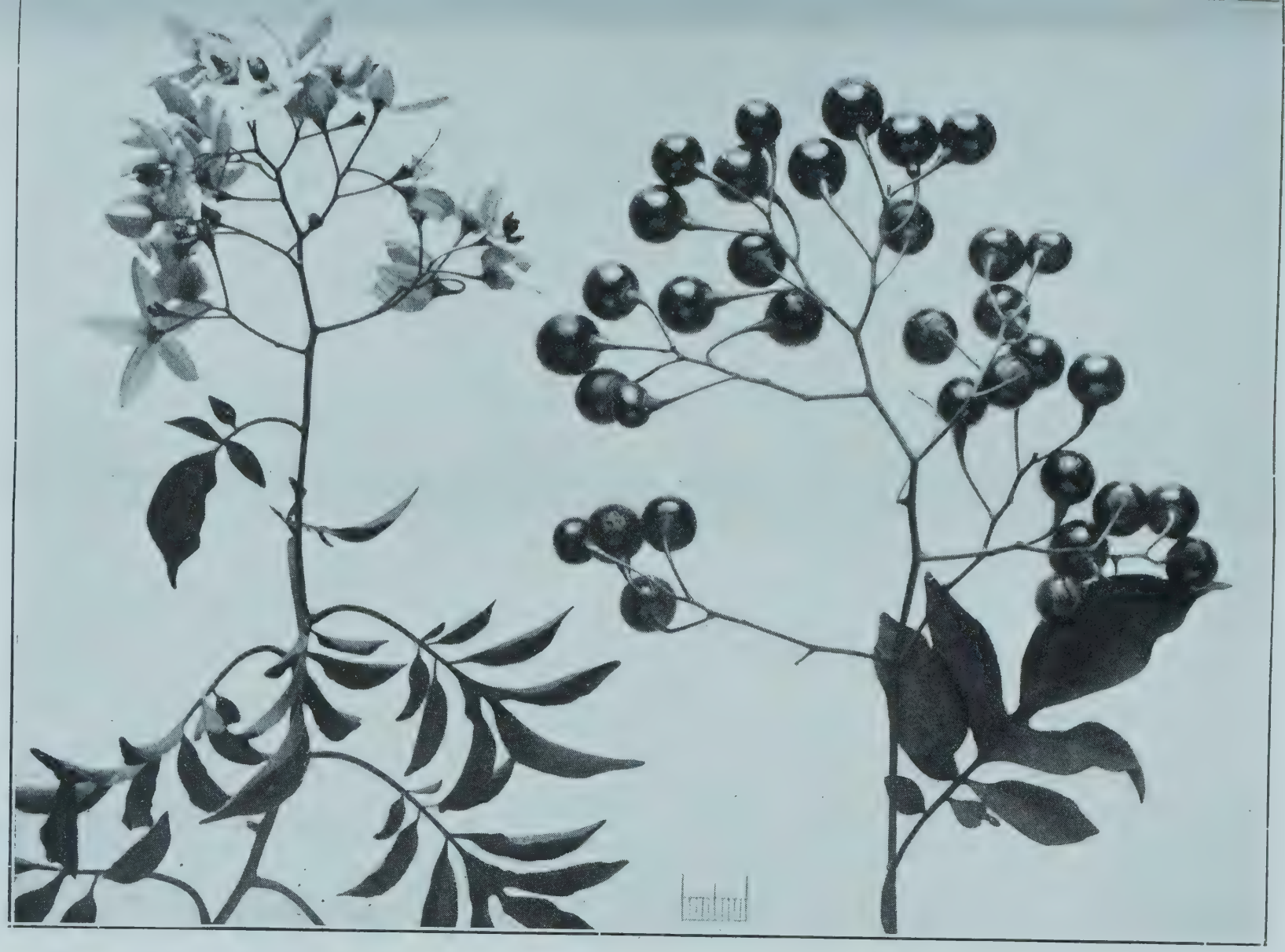

Photo : Dept. Agriculture and Stock.]

PLATE 53.—SOLANUM SEAFORTHIANUM.
(The measurement at base represents 1 centimetre—nearly ½ inch.)

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, FEBRUARY, 1923.

The weather throughout the month was very hot, and gave to competition birds a trying time. It has had a great effect on the birds that are coming into moult, and with many it also had a tendency to decrease the number of eggs laid during the month causing a great slowing down in their egg production. The following are the leading layers for February:—Light breeds—G. and W. Hindes, 117, followed by C. H. Singer with 116 eggs. In the heavy breeds R. Burns takes the lead with 121 eggs. The following are the individual records:—

Competitors.	Breed.	Feb.	Total.
LIGHT BREEDS.			
*N. A. Singer	White Leghorns	108	1,491
C. H. Singer	Do.	116	1,442
*W. and G. W. Hindes	Do.	117	1,363
*Bathurst Poultry Farm	Do.	103	1,259
*R. Gill	Do.	94	1,227
*S. L. Grenier	Do.	106	1,225
*J. M. Manson	Do.	107	1,215
*H. P. Clarke	Do.	110	1,204
*Mrs. L. Andersen	Do.	104	1,200
*W. Becker	Do.	105	1,200
*G. Trapp	Do.	82	1,197
*J. W. Newton	Do.	96	1,174
*W. A. Wilson	Do.	92	1,163
*G. Williams	Do.	89	1,119
*C. Goos	Do.	81	1,118
J. H. Jones	Do.	72	1,111
*R. C. J. Turner	Do.	96	1,105
*R. C. Cole	Do.	81	1,104
*F. Birchall	Do.	106	1,100
*Oakleigh Poultry Farm	Do.	86	1,100
A. G. C. Wenck	Do.	87	1,092
*O. Goos	Do.	85	1,070
*T. Fanning	Do.	42	1,053
*H. Fraser	Do.	82	1,051
N. J. Nairn	Do.	95	1,038
*Mrs. R. Hodge	Do.	44	1,036
*Thos. Taylor	Do.	100	1,033
*Mrs. E. White	Do.	81	1,022
*M. F. Newberry	Do.	85	1,013
*J. W. Short	Do.	72	1,010
*C. M. Pickering	Do.	81	988
T. H. Craig	Do.	60	984
B. Hawkins	Do.	65	979
*E. A. Smith	Do.	80	966
A. Maslin	Do.	75	960
J. Purnell	Do.	55	936
G. F. Richardson	Do.	76	913
E. Symons	Do.	73	898
H. Trappett	Brown Leghorns	86	898
E. Stephenson	White Leghorns	65	894
B. C. Bartlem	Do.	51	881
A. Anders	Do.	83	862
Brampton Poultry Farm	Do.	68	853
Parisian Poultry Farm	Brown Leghorns	44	574

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	Jan.	Total.
HEAVY BREEDS.			
*R. Burns	Black Orpingtons ...	121	1,361
*A. E. Walters	Do.	72	1,144
*T. Hindley	Do.	69	1,089
*C. C. Dennis	Do.	87	1,080
*R. Holmes	Do.	86	1,054
Jas. Hutton	Do.	83	1,049
*E. F. Dennis	Do.	69	1,041
Mrs. A. Kent	Do.	54	999
*H. M. Chaille	Do.	70	988
Mrs. A. E. Gallagher	Do.	57	985
Mrs. L. Maund	Do.	90	966
R. Innes	Do.	63	959
H. B. Stephens	Do.	92	958
*Jas. Potter	Do.	70	928
*Parisian Poultry Farm	Do.	88	904
V. J. Rye	Do.	82	886
W. Becker	Chinese Langshans ...	60	876
*Rev. A. McAllister	Black Orpingtons ...	71	874
C. Doan	Do.	64	864
Wambo Poultry Farm	Do.	45	862
Jas. Hitchcock	Do.	42	808
C. Rosenthal	Do.	78	805
W. C. Trapp	Do.	61	745
R. Burns	Silver-laced Wyandottes	32	681
*J. E. Smith	Plymouth Rocks ...	51	620
*Miss L. Hart	Rhode Island Reds ...	20	513
Total	...	5,463	71,160

* Indicates that the pen is being tested singly.

DETAILS OF SINGLE HEN PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total
LIGHT BREEDS.							
N. A. Singer	218	286	225	260	236	266	1,491
W. and G. W. Hindes	234	219	232	217	238	223	1,363
Bathurst Poultry Farm	170	198	224	220	246	201	1,259
R. Gill	226	219	226	213	153	190	1,227
S. L. Grenier	189	164	212	210	223	227	1,225
J. M. Manson	214	175	204	189	226	207	1,215
H. P. Clarke	199	189	195	218	199	204	1,204
Mrs. L. Andersen	230	171	209	195	208	187	1,200
W. Becker	199	169	207	197	204	224	1,200
Geo. Trapp	206	184	212	220	176	199	1,197
J. W. Newton	207	202	227	185	198	155	1,174
W. A. Wilson	202	183	158	208	200	212	1,163
G. Williams	174	192	210	197	185	161	1,119
C. Goos	138	177	184	202	235	182	1,118
R. C. J. Turner	193	163	202	190	196	161	1,105
R. C. Cole	220	165	206	158	179	176	1,104
F. Birchall	183	209	157	135	218	198	1,100
Oakleigh Poultry Farm	195	160	197	174	177	197	1,100
O. Goos	181	166	193	208	192	130	1,070
T. Fanning	133	172	193	172	235	148	1,053
H. Fraser	179	201	174	151	155	191	1,051

EGG-LAYING COMPETITION—*continued.*

DETAILS OF SINGLE HEN PENS—*continued.*

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS—*continued*							
Mrs. R. Hodge	207	137	171	155	220	146	1,036
Thos. Taylor	187	145	184	178	177	162	1,033
Mrs. E. White	196	110	214	141	153	208	1,022
M. F. Newberry	174	146	156	218	137	182	1,013
J. W. Short	165	162	191	156	169	167	1,010
C. M. Pickering	197	196	111	161	167	156	988
E. A. Smith	155	157	170	176	140	168	966
HEAVY BREEDS.							
R. Burns	220	220	211	252	222	236	1,361
A. E. Walters	188	157	153	196	241	209	1 144
T. Hindley	154	186	120	238	231	160	1,089
C. C. Dennis	183	188	188	161	184	176	1,080
R. Holmes	132	202	187	174	175	184	1,054
E. F. Dennis	150	177	197	110	197	210	1,041
H. M. Chaille	174	167	187	150	191	119	988
J. Potter	158	167	173	144	170	116	928
Parisian Poultry Farm	110	147	177	119	172	179	904
Rev. A. McAllister	158	174	159	107	89	187	874
J. E. Smith	76	118	97	86	106	137	620
Miss L. Hart	81	109	64	109	74	76	513

CUTHBERT POTTS, Principal.

PLATE 54.—THE STANTHORPE TOMATO POOL BOARD.

Front row : Messrs. S. R. Mitchell, W. H. Passmore (Chairman), W. H. C. Laird.

Back row : Messrs. M. E. Sewell, H. S. Dawkes (Secretary), A. E. Watts, J. S. Mehan (Manager).

NATIONAL UTILITY POULTRY BREEDERS' ASSOCIATION COMPETITION, ZILLMERE.

Some extremely hot weather was experienced during February, and there was a falling-off in production, 1635 eggs being laid, an average of 14 per bird. Two deaths occurred, Messrs. Kidd Bros.' No. 86, Black Orpington, died from rupture, and Mr. L. Andersen's No. 19, White Leghorn, succumbed to bowel trouble. Nos. 82, 101, 110, and 112 were broody.

Pen No.	Owner.	Feb.	Total.	Pen No.	Owner.	Feb.	Total.
			WHITE LEGHORNS.				
43	J. Davies	22	272	58	M. Newberry ...	8	206
29	A. S. Walters ...	18	267	19	L. Andersen ...	0	205
66	A. Cowley ...	21	261	9	P. Ruddick ...	13	204
2	A. Niel	1	256	57	M. Newberry ...	15	204
64	G. Trapp	21	255	20	L. Andersen ...	19	202
62	H. Sturman ...	20	251	30	A. S. Walters ...	13	200
34	J. Purnell ...	20	250	22	E. Stephenson ...	15	198
7	J. Harrington ...	19	247	73	A. F. Knowles ...	15	195
27	Oakleigh Poultry Farm	17	246	14	J. Hutton ...	18	195
				76	A. J. Bourne ...	13	192
70	A. Hodge ...	20	245	8	J. Harrington ...	8	192
53	A. W. Ward ...	21	241	36	Parisian Poultry Farm	16	190
39	P. J. Fallon ...	22	239				
25	P. F. Adams ...	17	238	16	T. Flood	17	190
63	G. Trapp	20	238	80	W. Bliss	19	190
13	J. Hutton ...	22	238	78	Kelvin Poultry Farm	20	188
68	R. D. Chapman ...	23	238				
79	W. Bliss	22	237	17	R. Shaw	3	187
77	Kelvin Poultry Farm	17	235	6	Wambo Poultry Farm	0	186
61	H. Sturman ...	18	235	11	J. Potter	15	184
72	Enroh Pens ...	13	232	81	E. C. Raymond ...	18	184
12	J. Potter ...	14	232	5	Wambo Poultry Farm	17	182
52	F. R. Koch ...	20	232				
55	W. H. Lingard ...	20	230	3	W. Becker ...	18	182
44	J. J. Davies ...	19	229	31	R. H. Woodcock	18	181
33	J. Purnell ...	11	224	59	C. Pickering ...	22	180
67	R. D. Chapman ...	19	224	38	Carinya Poultry Farm	0	179
40	P. Fallon	22	224				
10	P. Ruddick ...	18	223	82	E. C. Raymond ...	6	179
54	W. Ward ...	19	221	48	M. J. Lyons ...	0	176
24	M. H. Campbell...	19	220	65	A. Cowley ...	10	175
46	H. Needs ...	18	219	15	T. Flood	14	166
58	M. Newberry ...	21	219	71	Enroh Pens ...	12	163
23	M. H. Campbell...	23	219	75	A. J. Bourne ...	17	161
26	P. F. Adams ...	19	218	50	R. Turner ...	14	160
18	R. Shaw	19	211	60	C. Pickering ...	10	156
35	Parisian Poultry Farm	18	210	45	H. Needs ...	5	155
				4	W. Becker ...	14	152
56	W. H. Lingard ...	19	209	69	A. Hodge ...	3	135
49	R. Turner ...	10	209	32	R. H. Woodcock	12	128
37	Carinya Poultry Farm	20	209	74	A. F. Knowles ...	0	123
				28	Oakleigh Poultry Farm	0	107
47	M. J. Lyons ...	12	208				
41	G. Williams ...	17	208	1	A. Niel	15	42
51	F. R. Koch ...	18	207				

NATIONAL UTILITY POULTRY BREEDERS' ASSOCIATION COMPETITION, ZILLMERE—*continued.*

Pen No.	Owner.	Feb.	Total.	Pen No.	Owner.	Feb.	Total.
	BLACK ORPINGTONS.						
92	C. C. Dennis ...	22	263	86	Kidd Bros. ...	9	179
88	W. A. Blake ...	22	259	112	A. Niel	8	178
96	R. A. Boulton ...	10	245	106	H. Pearce ...	14	174
93	E. F. Dennis ...	24	244	104	J. Potter	4	173
91	C. C. Dennis ...	22	233	102	Parisian Poultry Farm	0	167
108	E. Walters ...	21	232				
89	T. Brotherton ...	23	225	109	Wambo Poultry Farm	0	165
107	E. Walters ...	6	215				
95	R. A. Boulton ...	9	214	83	J. Hutton ...	0	157
111	A. Niel	22	212	98	Enroh Pens ...	17	157
105	H. Pearce ...	17	210	97	Enroh Pens ...	17	156
101	Parisian Poultry Farm	9	200	110	Wambo Poultry Farm	13	155
103	J. Potter	10	197	90	T. Brotherton ...	9	151
84	J. Hutton ...	14	187	99	L. J. Pritchard ...	1	131
100	L. J. Pritchard ...	8	184	94	E. F. Dennis ...	0	114
87	W. A. Blake ...	9	183	85	Kidd Bros. ...	0	10
	OTHER BREEDS.						
120	T. J. Carr (S.W.)	20	209	114	Parisian Poultry Farm (B.L.)	12	166
119	T. J. Carr (S.W.)	21	203				
116	G. and W. Hindes (B.L.)	15	188	113	Parisian Poultry Farm (B.L.)	3	136
118	J. H. Jones (W.W.)	0	176	118	J. H. Jones (W.W.)	0	120
115	G. and W. Hindes (B.L.)	22	174				

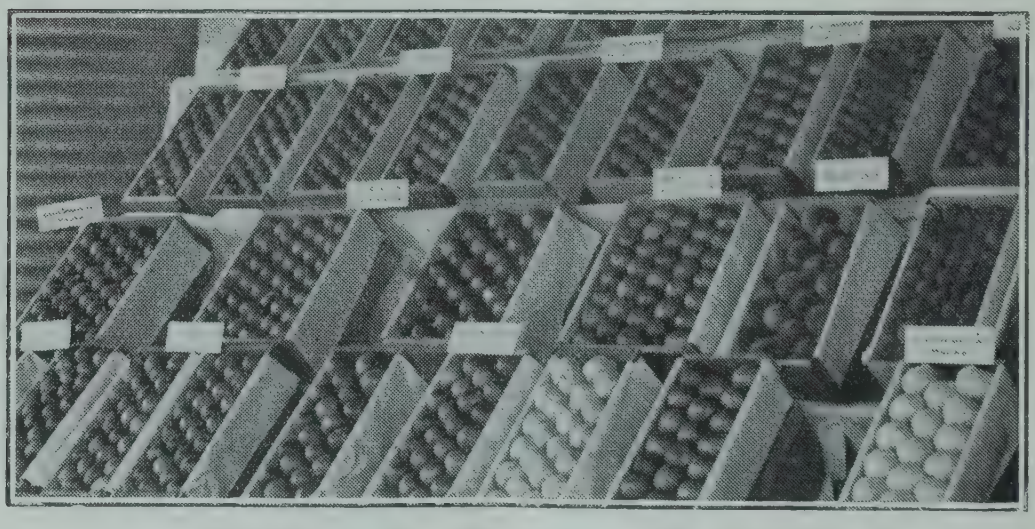

PLATE 55.—SECTION OF DEPARTMENT OF AGRICULTURE'S EXHIBIT AT THE STANTHORPE SHOW.

A valuable lesson in methods of fruit packing.

General Notes.

Regulations Under the Pools Act.

Additional regulations have been promulgated under "*The Primary Products Pools Act of* 1922." These provide that a Pool Board shall conspicuously display, at least every month in the Board's public office, a full and explicit statement of the Board's receipts and expenditure, stock transactions, and liabilities for the period since the last previous statement was so displayed. At least every year there shall be similarly displayed a full and explicit balance-sheet of the Board. These statements are to remain displayed until they are replaced by their successors, and shall be available for perusal and copying at reasonable hours by any person.

Departmental Appointments.

The following appointments have been made:—

Bessie Wolstenholme as Typiste.

W. A. R. Cowdry as Clerk.

F. B. Coleman as Inspector under the Fertilisers Act, the Pure Seeds Act, and the Stock Foods Act.

W. R. Straughan and O. L. Hassell as Agricultural Field Assistants.

R. G. S. Holt as Assistant to Bacteriologist, Townsville.

L. A. Burgess, Assistant to Analysts.

E. F. Duffy, Inspector under the Diseases in Plants Act.

F. G. Connolly as Assistant Instructor in Fruit Culture.

W. Ford as a Slaughtering and Brands Inspector.

W. C. Stables, of Yeppoon, as an Honorary Inspector under the Diseases in Plants Act.

Constables D. Pope, P. F. McIvor, and T. Caplice as Slaughtering Inspectors.

Constable P. Hogan and F. J. Baker (caretaker of Kirkland's Dip at Kynuna) as Stock Inspectors.

Sergeant Eric Stephenson as an Inspector under the Diseases in Stock Act and the Diseases in Plants Act.

The Nutmeg Pigeon.

The nutmeg pigeon of North Queensland has been added to the list of totally protected birds throughout the State.

State Insurance—Free Household Workers' Compensation Policies.

The Attorney-General (Hon. John Mullan) advises that the experience in connection with Household Workers' Insurance to date has been gone into by the Insurance Commissioner in connection with the preparation of the usual expiry notices to policyholders due to be issued shortly, and it has been found again that, as in the years ended 30th June, 1918, 1919, and 1921, the experience has been so satisfactory regarding this section of the business that expiry notices will be issued to policyholders shortly, stating that policies falling due on 30th June next, will be renewed free of any premium.

The Queensland Mangosteen.

For many years the United States Department of Agriculture sought for specimens of mangosteens with which to carry out cross-breeding experiments. The true mangosteen will not thrive even in subtropical climates, but it is thought that if a cross can be obtained with some varieties, such as are known to flourish on the Bellenden-Ker Range, North Queensland, a subtropical species might be evolved. The species referred to grow at high altitudes where temperatures naturally are much cooler than in plain tropics.

Two varieties are found on the range indicated—Garcinia Mestonii and Garcinia Gibbsæ. The first-named was discovered by Mr. Archibald Meston, and the latter by Miss L. S. Gibbs, of London.

The Queensland Department of Agriculture has devoted much attention to its native tropical fruits and was in a position to meet promptly the wishes of the United States authorities. The Queensland Government, on learning of the quest, decided to send an expedition to Bellenden-Ker for the purpose of securing seeds and plants for treatment. Mr. Cyril White, F.L.S., Government Botanist, and Mr. E. W. Bick, Curator of the Botanic Gardens, were entrusted with the task. The expedition was successful, and these two officers returned recently with about 400 seeds of each species.

One hundred and fifty of these seeds will be sent to America by the first opportunity. The remainder will be planted under glass in the Botanic Gardens. They will be artificially heated in winter, and when the plants have been sufficiently advanced they will be transported to America in special cases.

This is the first occasion on which the fruit of the Gibbsæ species have been collected, for the discoverer of the variety, the habitat of which is the Atherton tableland, contented herself with the flowers.

Messrs. White and Bick, who received valuable assistance from Messrs. Fraser and Merrotsy, forest rangers of the Atherton district, spent five days on Bellenden-Ker Range, finding the coveted fruit at elevations of from 1,500 to over 4,000 feet. The cyclone which swept across that very exposed region in 1918 had obliterated all traces of the old track up the eastern slope of the range, but the forest rangers had prepared another track, and personally conducted the botanists over the route. The weather proved delightfully fine, until the last day of their stay, when heavy rain drenched them. The nights were quite chilly.

Naturally this little-explored region proved a most interesting place to the botanists, who, while in special pursuit of mangosteens, kept their eyes widely open for any other rare specimens of plants. A number of these were secured, especially of the palm family, and it is believed that one or two species new to science have been obtained. These will be more closely examined and reported on in due course.

The mangosteen, contrary to its name, is not at all like a mango. It has the appearance of a green tomato, both in size and shape, and has a strongly acrid taste. So pronounced is this flavour in the case of the Gibbsæ species that even the hungry wild natives exclude it from their dietary.

Diseases in Plants—New Regulations.

Three new regulations have been added to the existing regulations under "*The Diseases in Plants Act of* 1916," whilst clauses 26-34 of the regulations dated the 12th January, 1917, and regulation No. 51 have been repealed. The new regulations number from 52 to 54.

Regulation 52 stipulates that no owner (or his agent) of an orchard shall permit any fruit, whether diseased or not, to be on the ground. He is required to gather all fruit that may drop to the ground and destroy such of that fruit that may be diseased by submitting it to the process of boiling, or as otherwise instructed by an inspector under this Act.

Regulation 53 deals with the codlin moth of pip fruit, and requires that orchards in which codlin moth is present shall be sprayed with an approved brand of arsenate of lead. The first spraying is to be given when the petals are falling from the flowers, and, if deemed necessary, a second and third spraying shall be given at intervals not exceeding three weeks from the time of the first application.

The first regulation also deals with the codlin moth and imposes upon the orchardist growing apple, pear, and quince trees the duty of keeping his orchard free from dead bark, broken limbs, props, or any other material likely to harbour the larvæ or pupæ of the codlin moth.

Australia's World Champion Butter Cow.

Australia now holds the world's record for the butter-fat production of a single cow, Melba XV. of Darbalara, a milking shorthorn, having produced 1,318·812 lb. of fat, equal to 1,586½ lb. of commercial butter, in 365 days. Her milk yield was 29,432 lb. This figure has been exceeded by several Friesian cows, but none of these has come within 60 lb. of Melba XV.'s butter production.

The Pineapple Crop—Ex-Soldiers' Distribution Scheme.

The soldier growers at Glass House Mountains are endeavouring to work out their own salvation. Their organisation, the United Fruit Growers' Association, has launched a distribution scheme by means of which they hope to place the greater part of their crop on the fresh fruit market at a price that will be fair to grower and consumer.

Every case of pineapples diverted from the canneries and sold as fresh fruit increases the return to the grower. It is obvious that a departure must be made from the obsolete marketing methods at present in vogue.

The growers of Glass House Mountains are translating the slogan of "direct from grower to consumer," into an accomplished fact. Cases of choice pineapples, 16 to 24 to the case, are being delivered to any address in Brisbane or suburbs for 6s., cases to be returned. Orders with cash are being received at the State Trade Office, Treasury Buildings, the Central Station Café, and the State fish shops, Valley and Victoria Bridge. Under this system, overhead charges are reduced to a minimum, and agents and retailers' profits eliminated. The consumer buys cheap fruit and the grower receives a fair return for his labour. Every possible care is taken to ensure the fruit arriving in a satisfactory condition. Only choice pines are marketed; cases are packed with straw to prevent bruising, and recipes for wine and jam making are enclosed in each case.

The mail order branch is already in full swing, orders coming from such distant places as Mount Morgan, Blair Athol, and Cunnamulla. The Glass House Mountains growers are appealing to the community generally for assistance in winning a livelihood on the land. Business men, employers of labour, and departmental heads can help by bringing the matter before the notice of their employees.

Direct Distribution.

In connection with the Glass House Mountains soldier growers' scheme of direct distribution from grower to consumer, the Trade Commissioner (Mr. W. H. Austin) advises that so far the response from the country has been very satisfactory. Quite a large number of other producers have decided to assist these growers and are making regular weekly purchases of pineapples while the crop lasts. Fruit also is going forward to the Mount Morgan miners and to the men on the Mundubbera railway extension. At the Ipswich workshops the employees have responded nobly. In the first week six cases were sent up to Ipswich on trial, the second week 30 cases were ordered, the third week 60 cases, and for the fourth week 120 cases were ordered.

Nodules in Beef—Successful Experiment.

Trial shipments of frozen beef under the new method of dealing with nodules, sent to London last year by Messrs. Borthwick and Co., and the Australian Meat Export Co., are the subject of a report dated 22nd December last, which the Premier (Hon. E. G. Theodore) has received from the Agent-General in London (Hon. J. A. Fihelly).

The report is prefaced by the following cablegram which Mr. Fihelly sent to Mr. Theodore on 20th December last: "Borthwicks and American companies' trial shipments under new method dealing with nodule most successful. Carcasses show great improvements and quite attractive. Port of London health authorities inspected this morning and seem favourable. Will cable their decision later when report to hand."

"It has long been recognised," states Mr. Fihelly, "that the disfigurement to hindquarters of Queensland beef caused by the search for and removal of nodules has affected their sale to some extent. Considerable interest was therefore evinced by the meat trade here in some shipments recently made by Borthwicks and Swifts of hinds dressed in such a manner as to cover the effects of the operation referred to. This has been done by lifting the skin from the portion affected before the meat was cut and carefully replacing it after the nodules had been removed. By this method the general appearance of the meat is undoubtedly rendered much more attractive, and the only thing to be considered now in connection with the experiment is whether the health authorities at the various ports have any objection to it.

"With the view of testing this point, shipments of 100 hinds have been made by Borthwicks to London, Liverpool, and Hull. The London consignment was unloaded from the Moreton Bay on the 19th instant, and on the 20th a number of the carcasses

were displayed by Messrs. Borthwick on their stall at the Central Meat Market, when, in addition to representatives of the meat trade and myself, the principal medical officer and other medical officers of health for the Port of London were invited to inspect them.

"The meat people were generally favourably impressed, and so far as could be gathered, the medical men approved of the arrangement provided that adequate guarantees are forthcoming that the work of removing the nodules is carried out as efficiently as heretofore. They have not yet, however, given their official decision in the matter, and it is possible that this may be withheld until the views of the medical officers of health at Liverpool and Hull have been obtained as a result of their inspection of the consignments above referred to made to their respective ports."

Pear Poison—State Arsenic Supplies.

In the course of a recent Press interview, the Minister for Mines (Hon. A. J. Jones) recalled that the mine and treatment works were established about five years ago for the express purpose of providing the shire councils and landholders who had prickly-pear on their holdings with arsenic for pear eradication at a low price. Immediately the Mines Department was ready to supply, the Cabinet decided to sell arsenic for pear destruction purposes at £10 per ton delivered at the nearest railway station. At that time the market price ruling was from £70 to £90 per ton. The Lands Department paid the Mines Department the difference between the cost of production and the £10 per ton, therefore the concession to farmers rightly belonged to the Lands Department. "It must be remembered," he added, "that the prickly-pear pest is a legacy handed down to this Government, and its destruction has now become a national question. At the same time, I am satisfied that the statement that pear is spreading at the rate of 1,000,000 acres a year is an exaggeration. However, it needs attention, and the Government recognises its obligation; the mine and arsenic works was established and is now the basis of pear destruction in the State."

"Hundreds of tons of State arsenic have been put into pear poison and sold direct at the cheap rate mentioned," Mr. Jones said, "and as a ton of arsenic kills many acres of growth, the State arsenic mine has contributed largely towards pear eradication, and has done much to keep it in check. However, the arsenic supplied at the absurdly low price of £10 per ton has not accomplished as much as I expected, for the reason that, arsenic not being soluble in water, the poison has to be mixed with other ingredients, and to give the best results the solution must be of certain strength—not too strong nor too weak. Its application to the pear is almost scientific and requires experience. Only recently one of our purchasers of arsenic at £10 per ton condemned the product of the State, although it was accompanied by a certificate from the Government analyst, and he paid £2 2s. for an analysis from the agricultural chemist, with the result that he had 96 per cent. grade. The difficulty was that he did not understand the mixing, which really is a scientific problem, and, in my opinion, for various reasons should not be left in the hands of the farmers. What is wanted is the supply direct to the farmers of a concentrated preparation in a powdered form of the poison which can be mixed with water.

"At present," Mr. Jones continued, "the manufacturers of arsenious pear poison place it on the market in liquid form, which again has to be mixed with water on the farm, and the price the farmer has to pay is out of all proportion to the value he receives. For instance, one line which is sold at 3s. 6d. per gallon contains less than 6d. in value, including the arsenic. We could manufacture this formula and place it profitably with the user at 1s. 3d. per gallon, allowing £50 per ton for the arsenic. The advantage of a concentrated poison in powdered form is in mixing, cost of transit by rail and cost of packing, and moreover it is less dangerous.

"The State mine at Jibbinbar is capable of producing all the arsenic used at present in Australia, although it is being brought into use recently for new purposes. Recently we supplied the South Australian Government with 62 tons of arsenic, which is used on their railway lines to check the growth of weeds and grass. The Queensland Railway Department is also supplied by us for that purpose. Although we have not refused an order during last year for pear destruction, by the end of the year we had accumulated 200 tons of arsenic. That has since been sold, chiefly in the South, and some for export to America, where there is a demand at present. To-day our orders exceed the quantity produced, but the orders received are mostly for export purposes, and we only sell our surplus after supplying the needs of the prickly-pear farmers and the manufacturers in our own

State. Arsenical poison is the most economical method of eradicating prickly-pear at the present time, and while much is to be hoped for from the research work of Professor Johnstone and others for a parasitical remedy, yet during the progress of this good work the pear is growing and spreading over many miles of good land adjacent to our railways, which, if cleared, would be producing and contributing revenue to the Railway Department. The State arsenic mine is the basis of pear destruction in this State."

Silage Stacking.

Advice and instruction respecting the making and stacking of silage is being given in the country by expert officers of the Department of Agriculture and Stock. At present Mr. C. S. Clydesdale (Assistant Instructor in Agriculture) is visiting the Canungra area, where he is giving demonstrations. Mr. S. M. Smith (field assistant) is in the Boonah district, where he is giving information relative to the stacking of maize and other material for silage purposes.

PLATE 56.—A STRIKING FEATURE OF THE RECENT SUCCESSFUL CHEESE "DRIVE."
A Queen-street Window Display.

Cotton Pests.

Referring to cotton pests, Mr. Atkins, the expert attached to the Cotton Growing Association, said that a representative of a firm carried out a liquid spray test under the auspices of the association. The solution used was thoroughly effective in killing the smaller grubs on contact without injuring the plant. Although the cost of treatment is fairly low, the association is not yet satisfied that the results will justify the labour involved in spraying. In a few days it is hoped to place on the market some kind of smoke balls, which will enable a field to be thoroughly fumigated by a sulphurous smoke cloud, which would rid it of all insect life at a very low cost. The grub seems to be identical with those found on other crops in the days before cotton was introduced, and it is possible an increase in their numbers has been brought about as a result of the drought-resisting properties of the cotton crop, combined with the dry season. There seems to be a noticeable decrease in the amount of damage which has been done during the past few days. Reports from the Dawson Valley point out that the damage being done by pests is now on the wane.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JANUARY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING JANUARY, 1923 AND 1922 FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Jan.	No. of Years' Records.	Jan., 1923.	Jan., 1922.		Jan.	No. of Years' Records.	Jan., 1923	Jan., 1922.
North Coast.	In.		In.	In.	*South Coast*—continued:	In.		In.	In.
Atherton	12·20	21	6·99	8·27					
Cairns	16·95	40	3·81	6·05	Nambour	9·46	26	5 99	4·39
Cardwell	17·21	50	4·31	3·92	Nanango	4·55	40	3·38	3·22
Cooktown	15·16	46	7·46	8·08	Rockhampton ...	9·12	35	5·49	4·36
Herberton	9·74	35	5·35	6·86	Woodford	7·47	35	4·31	3·49
Ingham	16·73	30	6·46	3·15					
Innisfail	20·95	41	11·37	6·03					
Mossman	18·37	14	7·61	9·25	*Darling Downs.*				
Townsville	11·78	51	1·14	5·23					
					Dalby	3·32	52	3·37	3·09
Central Coast.					Emu Vale	3·13	26	3·15	1·24
					Jimbour	3·78	34	1·18	1·48
Ayr	12·25	35	0·32	6·55	Miles	3·88	37	2·48	2·77
Bowen	10·48	51	0·91	5·12	Stanthorpe ...	3·55	49	2·80	1·20
Charters Towers ...	5·86	40	6·28	2·26	Toowoomba ...	4·95	50	2·91	2·28
Mackay	15·33	51	8·65	4·78	Warwick	3·51	57	3·29	1·29
Proserpine	18·22	19	4·26	3·12					
St. Lawrence ...	10·19	51	6·22	2·05					
					Maranoa.				
South Coast.					Roma	3·40	48	2·28	3·59
Biggenden	5·46	23	5·59	4·04					
Bundaberg	9·21	39	8·22	7·54	*State Farms, &c.*				
Brisbane	6·37	72	2·79	3·62					
Childers	7·94	27	4·44	6·13	Bungeworgorai ...	2·20	8	2·33	2·41
Crohamhurst ...	12·56	30	4·56	7·26	Gatton College ...	4·28	23	2·39	2·39
Esk	5·61	35	1·95	2·88	Gindie	4·00	23	1·85	3·91
Gayndah	4·83	51	3·56	2·13	Hermitage ...	2·90	16	3·28	1·40
Gympie	6·80	52	5·70	2·88	Kairi	8·35	8	4·65	...
Glasshouse Mts. ...	9·12	14	3·30	4·67	Sugar Experiment Station, Mackay	16·96	25	5·95	3·71
Kilkivan	5·79	43	2·64	1·14	Warren	6·89	8	3·59	2·44
Maryborough ...	7·43	51	5·17	3·14					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for January, 1923, and for the same period of 1922, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
State Meteorologist.

Orchard Notes for April.

THE COAST DISTRICTS.

In the orchard notes for March the attention of citrus growers was called to the necessity of their taking the greatest possible care in the gathering, handling, sweating, grading, and packing of the coming crop of fruit, as the returns for the labour expended in the upkeep of their orchards will depend entirely on the condition in which the fruit reaches the market. Many growers fail to realise the very important fact that the success of fruitgrowing does not depend merely on the proper working and management of the orchard, so essential for the production of a good crop of high-class fruit, but that the manner in which the fruit is handled and placed on the market is of even greater importance. In no branch of fruit culture is this more evident than in the case of citrus fruits, as no fruit pays better for the extra care and attention necessary to enable it to be marketed in the best possible condition. Every season there is more or less loss in the consignments sent to the Southern markets, the percentage depending mainly on the weather conditions, the loss in a wet year being much heavier than that in a dry year.

A very large percentage of the loss is due to what is known in the trade as specking—viz., a rotting of the fruit caused by a mould fungus, and this loss can be prevented, provided necessary precautions are taken. Although this matter was dealt with last month, it is of such vital importance to our citrus growers that it is necessary to again refer to it.

In the first place, growers must clearly understand that specking cannot occur on perfect fruit, the skin of which is free from injury of any kind. The fungus causing specking can only obtain an entry into the fruit through an injury to the skin; it will thus be seen that the remedy for specking is to take every possible care not to injure the skin of the fruit in any way.

Few growers realise how easily the skin of citrus fruits is injured, especially that of fruit grown under moist and humid conditions, when the skin is full of moisture and so tender that the least sign of rough handling causes serious injury, as the cells of the skin are so brittle that they are easily broken, and when so broken a ready means of entry for the mould fungus is provided, and specking follows in due course.

The remedy for specking is in the hands of the grower, who must learn so to gather, handle, and transport the fruit from the orchard to the packing-shed, that it does not receive the slightest injury, and further, that when it has reached the packing-shed it must be carefully placed in shallow bins or on trays and be exposed to the air for at least seven days, so that the surplus moisture in the skin may be removed, and the skin thus becomes toughened and less easily injured. This drying of the skin is known as "sweating," and during the time the fruit is being sweated it should be kept under observation, and all fruit showing signs of specking or injury from fruitflies, sucking or boring insects, mechanical injury or bruising, should be removed.

In order to prevent injuring the skin when gathering, all fruit must be cut and not pulled. Gloves should be used to handle the fruit, and when cut it should be placed in padded baskets or other suitable receptacles. Any fruit that falls or is injured in any way shoud be rejected, as it is not to fit to send to a distant market. At the same time, if the injury is only slight, it can be sent to a local market for quick sale.

For Southern markets only perfect fruit should be selected, and further, it must be graded for size, colour, and quality, and properly packed, only one grade of fruit being packed in a case. The cost of cases, freight, and marketing is now so high that only the best fruit will pay to send to the Southern States, and even the best fruit must be properly graded and packed in order to produce the best returns.

All orchards, vineyards, and plantations not thoroughly clean should receive immediate attention, as from now till the next rainy season the ground must be kept in a thorough state of tilth and free from weeds in order, in the first place, to retain moisture in the soil, and, in the second, to enable birds, ants, and predaceous insects to get at and destroy the pupæ of fruitflies and other pests harbouring in the soil.

Banana and pineapple plantations must be put into good order, and kept free from weed growth.

Land to be planted with trees should be got ready, as, if possible, it is always advisable to allow newy cleared land time to sweeten before planting.

Strawberries can still be planted, and the earlier plantings must be kept well worked and free from all weeds in order to get a good crop of early fruit.

Scrub land intended for bananas can be felled now, as there will be little more growth, and it will have ample time to dry off properly in time for an early spring burn. Do not rush scrub falling, as it is work that pays for extra care. Lopping will improve prospects of successful fire.

Keep a keen lookout for fruitflies, and on no account allow any fallen fruit of any kind to lie about on the ground unless you are looking for trouble with the ripening citrus crop. Keep the fly in check, and there will not be any very serious losses; neglect it, and there will not be much fruit to market.

The advice given with respect to the handling and marketing of citrus fruit applies equally to custard apples, pineapples, bananas, and other fruits. In the case of bananas handled by the Southern Queensland Fruitgrowers' Association, Limited, grading is now compulsory, and it will undoubtedly tend to stabilise the market for this fruit.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Practically the whole of the fruit crop will have been gathered by the end of March, but several of the later-ripening varieties of apples grown in the Granite Belt may be kept for a considerable time, provided they are free from fly or other pests and are stored under proper conditions. Varieties such as Jonathan can be kept for some months at a temperature of 31 to 32 deg., and later varieties, such as Granny Smith and Sturmer can be kept till apples come again if stored at the same temperature. At the same time, although storing the fruit at this temperature under artificial conditions enables them to be kept for many months, the fruit can be kept for a considerable period, and marketed from time to time as desired, by storing it in a specially constructed apple-house in or adjacent to the orchard where grown.

Such a store can be cheaply constructed in the side of a hill out of the soil of the district and slabs of timber. The soil will make excellent pisé for walls, and the roof may be constructed of slabs covered with soil. Such a store can be kept at a very even temperature, and if the air is changed during cool nights—not frosty nights—the temperature can be reduced to a low point—low enough to keep the fruit in good condition for many weeks.

All orchards and vineyards not already cleaned up must be put in order, and all weeds destroyed. Keep the surface of the soil stirred so as to give birds and insects a chance to get at any fruitfly pupæ, as it is necessary to destroy this pest whenever there is a chance of doing so.

Land intended for planting during the coming season should be got ready in order to expose the soil to the cold of winter, thus rendering it sweeter and more friable.

If there is any slack time in the course of the month, go over all surface and cut-off drains and put them in good order. Also, if during periods of heavy rain, soft or boggy spots have made their appearance in the orchard, do what draining is necessary, as badly drained land is not profitable orchard land, and the sooner it is drained the better for the trees growing upon it. Soft or boggy spots are frequently caused by seepage of water from a higher level. In this case a cut-off drain will be all that is necessary, but where the bad drainage is due to hard pan or an impervious subsoil, then underground drains must be put in. After draining, the land should be limed. Liming can be done now and during the following three months, as autumn and winter are the best times to apply this material.

When the orchard soil is deficient in organic matter (humus) and nitrogen, try the effect of green-crop manuring, planting the grey or partridge pea and manuring the ground for this crop with a good dressing of finely ground island phosphate or basic phosphate.

Where citrus fruits are grown, they should now be ready for marketing. If the land needs it, it should be given an irrigation, but unless the trees are suffering from want of water it is better to stick to the use of the cultivator, as too much water injures the keeping and carrying qualities of the fruit.

The remarks on the handling and packing of citrus fruits in the coast districts apply to the inland districts also, but these districts have an advantage over the coast in that, owing to the drier atmosphere, the skin of the fruit is tougher and thinner and in consequence the fruit carries better.

Farm and Garden Notes for April.

FIELD.—Those areas already lying in fallow for subsequent sowing with wheat should be kept in good tilth, using field implements that have a stirring effect in preference to those which tend to reverse the surface soil. The surface should never be allowed to cake; consequently all showers must be followed by cultivation, as soon as conditions will permit of teams and implements working freely.

Early fodder crops, such as barley (skinless or Cape) and certain varieties of wheat may be sown during April:—Growers of winter fodders will be well advised to study the article dealing with dairy fodder plots which appeared in February, 1922. Journal.

In those areas where seasonable rainfall permitted the planting of potatoes, these should now be showing good growth and must be kept free from all weed growths by means of the scuffle. If sufficiently advanced, and any doubt exists as to the prevalence of blight, advantage should be taken of fine weather to give a second spraying of "burgundy mixture," a calm and somewhat cloudy day being chosen if possible for the spraying.

Where land has been previously well prepared, lucerne sowing should be carried out this month, and intending growers of this fodder will be well advised to ascertain the germinating qualities of seed submitted to them for purchase. The difference between a good and bad "strike" is often traceable to the poor class of seed sown.

Maize and cotton crops should now be in the harvesting stage, and, once matured, are better in the barn than the open paddock, where weevils and other insects are usually prevalent at this season of the year.

Root crops sown last month should now be making fair growth, and during the early period of such should be kept free from weeds, and, where necessary, thinned out. Sowings of mangels, swedes, field carrots, sugar-beet, and rape may still be made where conditions of moisture will permit.

As the sowing season is close at hand for certain varieties of wheat, *i.e.*, those which require a fairly long period to develop in, every effort should be made to bring the seedbed into the best possible tilth and to free it from foreign growths of all kinds. The grading of all seed-wheat is strongly recommended, and growers who favour certain varieties should adopt a system of seed selection from prolific strains with a view to the raising of larger quantities of pure typical grain for ultimately sowing in their larger fields.

Pickling of wheat to prevent smut (bunt) is necessary. Germination tests should be carried out prior to commencing seeding operations.

Sorghums which have matured and are not immediately required as green fodder should, wherever possible, be conserved as ensilage to provide for a reserve, to tide over the period when grasses and herbage are dry. Succulent fodder of this description is the best possible form of insurance against drought, and for maintaining dairy and other stock in thrifty condition.

KITCHEN GARDEN.—Hoe continually among the crops to keep them clean, and have beds well dug and manured, as recommended last month, for transplanting the various vegetables now coming on. Thin out all crops which are overcrowded. Divide and plant out pot-herbs, giving a little water if required till established. Sow broad beans, peas, onions, radish, mustard and cress, and all vegetable seeds generally, except cucumbers, marrows, and pumpkins. In connection with these crops, growers are recommended to adopt some form of seed selection for the purpose of improving the quality of vegetables grown by them. Just at present, selections should be made from all members of the cucurbitaceæ (pumpkins, cucumbers, &c.). Tomatoes should also be selected for seed. Early celery should be earthed up in dry weather, taking care that no soil gets between the leaves. Transplant cauliflowers and cabbages, and keep on hand a supply of tobacco waste, preferably in the form of powder. A ring of this round the plants will effectually keep off slugs.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET,

AT WARWICK.

1923.	JANUARY.		FEBRUARY.		MARCH.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	5·1	6·49	5 25	6·46	5·45	6·24
2	5·2	6 50	5·26	6·46	5·46	6·23
3	5·3	6 50	5·27	6·45	5·47	6 22
4	5·3	6·50	5 28	6·44	5·47	6·21
5	5·4	6·50	5 29	6·43	5·48	6·20
6	5·5	6·51	5·30	6·43	5 48	6·19
7	5·5	6·51	5·30	6·42	5·49	6·17
8	5·6	6·51	5·31	6·41	5·49	6·16
9	5·6	6·51	5·32	6 40	5·50	6·15
10	5·7	6·51	5·33	6·39	5·50	6·14
11	5·8	6·51	5 33	6·39	5·51	6·13
12	5 9	6·51	5·34	6·38	5·51	6·12
13	5·10	6·51	5·35	6 38	5·52	6·11
14	5 11	6·51	5·36	6·37	5·53	6·10
15	5·12	6 51	5 36	6·36	5·54	6·9
16	5·12	6 51	5 37	6·35	5·54	6·7
17	5·13	6·51	5·38	6·35	5·55	6·6
18	5·14	6 50	5·38	6·34	5·56	6·5
19	5·15	6·50	5·39	6 33	5·56	6·4
20	5·16	6 50	5·40	6·32	5·57	6·3
21	5·16	6·50	5 40	6·32	5·57	6·2
22	5·17	6 50	5·41	6·31	5·58	6 0
23	5·18	6·49	5 41	6·30	5·58	5·59
24	5·19	6·49	5·42	6·29	5·59	5·58
25	5·20	6·49	5 42	6·28	5·59	5·57
26	5 20	6·48	5·43	6·27	6·0	5·56
27	5·21	6·48	5·44	6 26	6 0	5·55
28	5·22	6·47	5 45	6 25	6 1	5·53
29	5·23	6·47	...	...	6·1	5·52
30	5·24	6 46	...	...	6·2	5·51
31	5·25	6·46	...	...	6·2	5·50

PHASES OF THE MOON, ECLIPSES, OCCULTATIONS, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania when "Summer" Time is not used.

3 Jan.	○	Full Moon	12 33 p.m.
10 „	☽	Last Quarter	10 55 a.m.
17 „	●	New Moon	12 41 p.m.
25 „	☾	First Quarter	1 59 p.m.

Perigee on 8th at 9.54 p.m.
Apogee on 23rd at 11.24 p.m.

On 3rd January at 9 a.m. the Earth will be in perihelion, its least distance from the Sun about 91,300,000 miles. Three days later Venus will be in perihelion, and will be about 17,000,000 miles further from the Earth than it was on 25th November when in perigee.

On 29th January Mercury will be passing to the west of the Sun about 4 degrees on its northern side.

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2 Feb.	○	Full Moon	1 53 a.m.
8 „	☽	Last Quarter	7 16 p.m.
16 „	●	New Moon	5 7 a.m.
24 „	☾	First Quarter	10 6 a.m.

Perigee on 4th at 5.18 p.m.
Apogee on 20th at 6.18 p.m.

On 4th February Venus, apparently on the western border of Sagittarius, will be at its greatest western elongation, about 47 degrees from the Sun. On the 6th, soon after sunset, Saturn will be occulted by the Moon when below the horizon, but about four hours later the Moon, Saturn, and Spica will be apparently near to one another low down in the east.

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3 Mar.	○	Full Moon	1 24 p.m.
10 „	☽	Last Quarter	4 31 a.m.
17 „	●	New Moon	10 51 p.m
26 „	☾	First Quarter	2 42 a m.

Perigee on 4th at 8.48 p.m.
Apogee on 20th at 6.24 a.m.

The Moon will be partly eclipsed on the afternoon of 3rd March, and there will be an annular eclipse of the Sun on the 17th, but neither will be visible in Australia.

Saturn will be occulted by the Moon about 2 a.m. on 6th March, when apparently near to the bright star Spica in the constellation Virgo. This fine combination of celestial objects will be then high up in the sky, nearly overhead.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter, and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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QUEENSLAND AGRICULTURAL JOURNAL

VOL. XIX. APRIL, 1923. PART 4.

Event and Comment.

The Current Issue.

In this issue many matters of importance affecting rural industries are fully dealt with. Special consideration has been given to the organisation of the agricultural industry in Queensland, and attention is called to the second article of the series covering an account of Californian co-operative methods and their applicability to Queensland. In this contribution Mr. J. D. Story's American investigations are readably set out. The entrance of the Queensland Producers' Association on its second year fittingly calls for a review of its functions and actual achievements, though, admittedly, the first year was devoted largely to organising preliminaries and spade work. In the report of the delegation from the recent Sugar Conference to Melbourne current sugar questions are well covered, and canegrowers will find much other matter to interest them in Mr. Edmund Jarvis's Science Notes and the regular field reports. Cotton, Queensland's coming industry, is well served with seasonable comment and instruction. General agriculture is served by timely notes on silage by the Director of Agriculture, Mr. H. C. Quodling. Topical illustrations are, as usual, a notable and popular feature. Much other interesting matter makes the April Journal a very readable number.

Farm Bureaux.

In the course of the first series of notes on Mr. Story's observations of Californian co-operative practice, published in the March Journal, the American farm bureaux system was fully described. It is a system well worthy of the closest study by those concerned in extending the operations of the Queensland Producers' Association. What has been accomplished in other countries in the way of agricultural organisation can surely be done in Queensland, and the experience of farmers in other parts of the world is valuable as an aid in evolving a solution of our own rural problems.

The Local Producers' Association.

The local producers' association as well as the district council possesses the possibility of becoming largely an educational agency in the broadest sense of the term. One of its best contributions to the welfare of the agricultural industry will surely be the dissemination, in an organised way, of methods of better farming practice as its members see it. When a need arises it will, as an organised unit, be in a good position to handle local and general economic problems in a practical and business-like way. The local association will, of course, comprehend clearly that in order to be an agent of progress it must also be a vehicle of work. It must be a creative, driving force. It must have a definite programme and definite projects. It must lay the tapes for attack on problems confronting the industry, and it will proceed precisely as fast as the members are willing to devote time and attention in tackling those problems. When an objective is reached, digging in and consolidation are essential. No association is worth its salt unless it does something. The mere passing of resolutions is seldom effective as a means of progress. Many organisations have been bogged in the morass of negation. Their members gradually worked themselves up into a state of mind whereby they somehow felt that by carrying resolutions they caused the world to advance. Days were spent in appointing committees and wrangling over the wording of flowing sentences, and the return home was doubtlessly lightened by a glowing sense of something attempted, something done, but without the knowledge that the sun had set upon a world no different from that upon which it had risen. As in all other enterprises utility must replace futility.

A Basis Upon Which to Build.

To be effective a Local Producers' Association must secure the active co-operative interest and work of all its members. No committee or board of directors alone can carry a local association forward to success. The greater the number of individuals involved in solving a problem the more certain it is that it will be solved correctly and the quicker will that solution be reached. The work of an association should be built up not only on a district programme, but on a community, or even an individual, programme. Members should lay down, at the beginning of each term, not only the part the district council is going to take in a programme of agricultural progress, not only the work which each centre is going to do and the projects it is going to further, but how farmers individually are going to act in aiding in the plan—what action they personally are to take in the enterprise. Built upon such a basis, the Local Producers' Association must become one of the most potent factors in rural life.

The Prickly-pear Commission.

The Royal Commission appointed by the State Government to inquire into the spread of the prickly-pear pest in Queensland and methods of controlling it has been busy, in the course of the month, taking evidence in Brisbane from scientists, departmental experts, and others. Further evidence is being taken in centres along the Western line, and it is the purpose of the Commission to visit pear-infested country and interview the holders. Subsequently, visits will be paid to other parts of the State where evidence will be taken and investigations made. Later, the Commission may take additional evidence if it is available in the capital.

The Cotton Guarantee.

"The cotton guarantee for the 1924 season has been fixed at 5d. per lb. for cotton of good quality, even though the staple is less in length than 1¼ inches." The Premier (Hon. E. G. Theodore) made this announcement recently and added:—"The Government Cotton Expert (Mr. C. Evans), after his tour through the cotton-growing areas, and his consideration of the whole question, has advised the Government that the guarantee for the 1924 crop should be reconsidered with a view to giving better terms to the growers. He pointed out that the existing conditions involved the payment of 5½d. per lb. for seed cotton of not less than 1¼-inch staple and 4½d. per lb. for cotton of shorter staple, but of good quality. He says that the only type of cotton that will produce a 1¼-inch staple is Durango, and there will not be sufficient

of this seed to distribute amongst the growers. It will be clear, therefore, that under the existing terms of the guarantee the growers could only look for 4½d. per lb. for the 1924 crop. He has recommended, and the Government has agreed, that the guarantee should be 5d. per lb. for all cotton, even though it is less than 1⅛-inch staple, for the season 1924. In the meantime the Department of Agriculture will continue to control the production of Durango seed cotton, with a view to having sufficient of this seed available for the 1925 season. The Government has communicated with the Commonwealth Government asking its concurrence with the terms of the new guarantee. I anticipate that they will agree, and therefore give further encouragement to the cotton growers to make early preparation for the 1924 season.''

Cotton Grading.

In the course of a recent Press interview the Minister for Agriculture and Stock (Hon. W. N. Gillies) said that the work of classification and grading of cotton is being taken in hand. Government cotton advisers have been paying special attention to this question, for it is essential that the article for sale shall be presented to the oversea buyers in the most attractive way. If this were not done, the worst bale of cotton shipped would most likely determine the price of the lot. This action will not in any way interfere with or alter the conditions of the Government guarantee. Mr Gillies stated further that, as a result of advice received from the experts, steps were to be taken at once to select areas of land, with soil typical of the districts where cotton was growing, where Durango and other seed would be raised on a large scale. In the course of a year or two, by this scheme, the whole of the requirements of the growers could be supplied with best known varieties of seed.

The Value of Pasteurisation.

The report of the South Burnett Co-operative Dairy Company contains an interesting reference to the value of pasteurisation, and states that since the company installed its pasteurising plant very satisfactory results have been achieved. The following comparison is made from the figures supplied:—

Butter manufactured in January, 1922. (Not pasteurised.)		Butter manufactured in January, 1923. (Pasteurised.)	
Choicest	Nil	Choicest	34 p.c.
First	40 p.c.	First	61 p.c.
Second	32 p.c.	Second	5 p.c.
Third	18 p.c.		
Pastry	10 p.c.		

These results were achieved under similar weather conditions.

Cotton Pests.

Discussing cotton pests with a Press interviewer recently, Mr. C. Evans (Cotton Adviser to the Queensland Government) said that the pink boll worm, which is unknown in Queensland, must not be confused with the boll weevil, which is an entirely different insect and the cause of such enormous damage in the United States of America. The boll weevil, so far as is known, is absolutely confined to the cotton States of U.S.A. and Mexico. The pink boll worm, on the other hand, is a native of India, where it has been known and studied for many years. The pink boll worm was introduced into Egypt about 1910 in some bales of cotton imported from India for the Alexandria spinning mills. These bales contained some seed which had passed through the gin, and this seed carried the larvæ of the pest in the resting stage. The pest spread rapidly through the Nile Delta and seemingly became very destructive under Egyptian conditions. The Egyptian experience and experience of the pest in other countries emphasised the care that must be taken in the importation of cotton seed from abroad, and the necessity for strong and strictly observed quarantine regulations. Any person who imports seed through the post privately may unwittingly introduce a pest of this sort into Queensland, and so be the means of causing the greatest damage to our young and promising cotton-growing industry.

ORGANISATION OF THE AGRICULTURAL INDUSTRY IN QUEENSLAND—II.

BY J. D. STORY, Chairman Administrative Committee, Council of Agriculture; and J. F. F. REID, Editor of Publications, Department of Agriculture and Stock.

In the first article of this series, published in the March Journal, the American Farm Bureau Organisation was described and compared with the plan of the Queensland Producers' Association. In this instalment various phases of American marketing methods, relating more particularly to fruit, but capable more or less of diversified application, are discussed.—Ed.

GRADING, PACKING, AND MARKETING.

In a previous article the organisation of agriculture has been dealt with, and the Queensland Producers' Association has been compared with the American Farm Bureaux Organisation. The farmers of America realise that the marketing problem is one of the greatest and most important questions they have to meet for many years. The farmer had been accepting whatever price he had been offered, and paid what he had been asked, but he realised that there was somehow, somewhere, too broad a margin between what he got and what the consumer paid. Hence the farmers got together to try to overcome their marketing difficulties.

In most of the States, Government market departments have been established to assist the producers, and, though the operation of these departments vary slightly in the different States, their general functions are similar—namely, to investigate market conditions; to furnish advice and assistance to producers, distributors, and consumers; to promote effectual and economical methods of marketing; to establish, administer, and enforce standards of weights, grades, and measures; to assist in the organisation and development of co-operative associations; and to collect and distribute market information. Many of the State departments issue daily market reports, and publish weekly, fortnightly, or monthly bulletins dealing with general marketing questions.

The Question of Distribution.

No matter how scientific food production may become in the actual labour processes, it cannot attract or hold the efforts of its followers unless adequate provision can be made for distribution of products. Though in the past the organisation of agriculture has not got very far beyond the gateway of the farm, the same is not true of other industries. The factory, for example, would not abandon its goods as soon as they were manufactured, but the premier ability of such a concern would be included in its selling organisation, and that organisation would be supplied with the capital necessary for efficient working.

In many instances the farmer has waited for some outside agency to solve his problems for him, and this waiting has not improved his own condition or that of the consumer. It must be remembered that such outside organisations do not undertake projects for the love of the work; these organisations are not so much concerned in the expenses incurred by the farmer in producing and sending his goods to market as they are concerned in selling the goods at a price which will return a commission.

American Experience.

The consensus of opinion in California now is that the State Market Division can be used to no better advantage than in assisting in the organisation and maintenance of associations for the co-operative marketing of the food supply of the State.

A survey was made in 1919 comparing wholesale prices of organised products with prices of unorganised products, and it was found that the prices of unorganised products had increased over the 1914 prices 26 per cent. more than the prices of organised products.

Co-operative selling by farmers is not a radical departure from, but is rather the adoption of, accepted business practice in the manufacturing world. The average farmer, engaged as he is in actual production, cannot be expected individually to

organise efficient marketing machinery, but he can organise very satisfactorily in conjunction with his fellows, and employ, to attend to the problems of distribution, the same high grade type of man as is employed by the manufacturer.

So far as can be gathered, the solution of marketing problems, as applied to agricultural products generally, has not yet been solved, and no one organisation or group of associations has been established to take charge of the whole of the marketing. In various States, however, various organisations have achieved success in the marketing of certain products for their members—in some instances such organisations handle only a particular product, and in others different products of a similar kind.

In the State of California, for example, over thirty associations last year attended to the marketing of approximately 50 per cent. of the total agricultural and horticultural output, such percentage being of the aggregate value of 250,000,000 dollars. For the purpose of co-ordination and continued assistance the Director of Markets arranges with each association, which he assists in organising, that he shall have the right to nominate one of the directors; he does so in order that he may keep in touch with the activities and the policy of the association; usually he nominates a man of proved business ability.

Factors Affecting the Problems of Marketing and Distribution.

In dealing generally with the marketing problems, and taking it for granted that good-quality products can be produced, there are a number of factors which must be taken into consideration—harvesting, grading, packing, knowledge of market requirements or demand, transport arrangements, selling agencies, and advertising. Though these factors are necessarily inter-related, let us divide them for purposes of study into two sections—first, those dealing with the preparation of products for market; and, second, those relating to the organisation of the selling of the products so prepared. As a concrete example of successful co-operative marketing as applied to a particular class of product let us consider the methods of the California Fruit Growers' Exchange in the marketing of citrus fruit.

Californian Experience prior to Co-operation.

Though the citrus industry at California is now fairly established, it had a very small beginning and experienced many difficulties. In the early history of the industry lack of co-operation and systematic marketing methods made the future of citrus crops uncertain. The fruit was carelessly handled, irregularly graded, packed in slipshod manner, and shipped to this or that market indiscriminately. Under such conditions the fruit kept poorly, markets were alternately glutted and under-supplied, and with increasing production the marketing abilities of the small distributors were taxed to the utmost and the business was hazardous to fruit merchants and growers alike.

In 1892-3 growers, in many instances, not only furnished their entire crop for nothing, but were also required to pay the freight and packing charges which the gross sale of their fruit did not cover. It was frequently the case that the larger the crop the more the grower was indebted to his packer at the end of the season. A continuance of these conditions would assuredly have forced many growers to dig up their trees.

Genesis of the Californian Fruitgrowers' Exchange.

Following upon this year of disaster the growers held a convention, and decided to work out the marketing problems amongst themselves.

As a result of that convention, the organisation of associations and district exchanges was effected in all the principal citrus fruit districts, and it was arranged that the packing should be done by the associations at cost, and that the marketing should be managed through an executive committee composed of one member from each district. The results during the first two seasons were not entirely satisfactory, and the central exchange was organised—that organisation has since developed into the present Californian Fruit Growers' Exchange.

The exchange system was simple and democratic. The local association consisted of a number of growers contiguously situated, who united for the purpose of preparing their fruit for market on a co-operative basis. They established their own brands and made their own rules as to the grading, packing, and pooling of their fruit. Usually these associations owned thoroughly-equipped packing houses; every grower's fruit was separated into different grades according to quality and placed in the common pool. Later, each grower received his percentage of the returns according to grade.

The theory upon which the exchange worked was, that every grower is entitled to furnish his *pro rata* of the fruit shipped through his associations and every association to its *pro rata* of the various markets of the country. This theory, reduced to practice, gives every grower his fair share, and the average price of all markets.

PRESENT METHODS OF PREPARING ORANGES FOR MARKET.

It is recognised that good-quality fruit and regular supplies are necessary in the stabilisation of a marketing scheme. Due attention therefore is given, in many cases under the direction of the associations, to the cultivating, fertilising, irrigating, pruning, and fumigating of orchards; and varieties of trees have been selected with a view to securing a year-round supply.

The two principal varieties of oranges now grown are the "Navel," which matures in the winter months, from December to May, and the "Valencia," which matures in the warmer weather, from May to December. Ninety per cent. of the oranges grown in California are of these varieties.

Field Operations.

The picking is done in many cases by picking crews directed by the local packing associations. Oranges and lemons are not picked or pulled from the trees, but are carefully clipped from the branches with specially designed clippers. The stem is clipped close to the fruit, so that no stem end is left to puncture or scratch other fruit when packed. The orange is carefully removed from the tree to avoid its being scratched on the limbs of the tree, and is carefully placed in a picking sack to prevent its being bruised. Bruises and skin punctures allow decay spores to enter, and thereafter spoilage quickly follows. Ordinarily, oranges and lemons will not decay quickly unless the skin has been injured, and consequently the fruit is handled from the time it is cut from the tree almost as carefully as eggs are handled.

When the picker's sack is filled, the fruit is placed in field boxes by lowering the sack into the box, unfastening a flap at the bottom of the sack, and then carefully lifting the sack from around the fruit. Each picker also places a tag or a mark of some kind in each box filled by him, and faulty handling can easily be traced. The fruit is then carted to the packing shed in trucks covered with tarpaulin to protect the fruit from the sun, and several boxes from each load delivered are inspected to ascertain the care which is being shown in the picking of the fruit.

Packing and Grading.

The work of the packing-house begins with the cleansing of the fruit; this is generally done by passing it through huge washing machines equipped with swiftly revolving soft brushes and using clean warm water. Next, the fruit is conveyed by mechanical means from the bath through the dryer, where it is exposed to a heavy blast of air, which thoroughly dries it before it is landed on the grading table.

At the grading table every orange is examined by experts, and carefully placed in the grade to which it belongs. The graders stand before a long belt, on which the fruit is carried, and pick out the various grades and place them on conveyors to be automatically sized according to diameter, and carried to the proper bins for wrapping and packing.

Packers, wearing soft white gloves to prevent injuring the skin of the fruit, carefully wrap the fruit and place it in boxes for market. In order that carelessness may be corrected, each packer places a ticket in each box packed. Oranges are packed in different sizes, each size being placed in the box in a certain geometrical arrangement, and each box containing a specified number of oranges (varying according to size). A box of "Sunkist 126," for example, would contain 126 oranges of best quality and appearance and of uniform size.

The standard grades are fixed by representatives of the growers, packing associations, and distributors, and it is claimed that the regular supply of uniformly graded fruit has given general satisfaction to the consumer, the selling agent, and the grower. The C.F.G.E., which supervises most of the marketing operations of oranges, lemons, and grape fruit in California, pays special attention to the marketing of the "Sunkist" brand, and employs its own inspectors to ensure that fruit packed under that label is up to standard. The attached particulars in regard to grade specifications, kindly supplied by the Exchange, may be of interest to the citrus growers of Queensland.

MARKETING ORGANISATION.

THE LOCAL ASSOCIATION.

In California the individual packing shed is a thing of the past. The associati sheds are controlled by a directorate elected by the growers, and a manag experienced in the handling and selling of fruit is appointed. The growers who a members of the association are required to sign contracts, and are not permitted interfere with the management of the sheds. These contracts provide that the grow shall pick, haul, and deliver to the packing shed of the association, and at such tim and in such quantities as the association or its agent may direct, all the citrus fru grown upon his land during the term of the agreement. The association agrees receive, pack, sell, and market all the fruit whenever a market can be found, and pay to each of the growers the amount received for his fruit less the charges f packing, transport, and selling.

THE DISTRICT EXCHANGE.

Next to the Local Association (or Exchange) comes the District Exchange, whi is also run on a no-profit basis. These District Exchanges act as clearing houses marketing the fruit for the Local Associations, and act as the media through whi most of the business between the Local Associations and the Central Exchan (referred to later) is performed. The District Exchange orders cars and sees th they are sent to the various association loading places; keeps a record of the ca shipped by each association and of their destination; receives information from t Central Exchange on all phases of marketing, and places that information before t Local Associations; receives the proceeds for the sale of the fruit, and apportio such proceeds to the associations concerned. Each of the Local Associations ente into a contract with the District Exchange to the effect that it will market throug the District Exchange the whole of the fruit produced by its members, and that t District Exchange may retain brokerage to cover the expenses incurred. The agre ment further provides that the District Exchange shall do its best, as the agent of t associations, to sell and dispose of the fruit; but it accepts no responsibility financial liability other than receiving the proceeds and apportioning them equitab after deducting brokerage for expenses. Associations which fail to deliver fru controlled by them loaded on cars at the loading stations are charged 25 cents per b as damages.

THE CENTRAL EXCHANGE.

Powers and Functions.

After the District Exchange comes the Central Exchange, which is really central executive, whose duty it is to furnish marketing facilities to the Distri Exchanges at a *pro rata* share of the cost. Each District Exchange enters into agreement with the Central Exchange to the effect that it will ship all fruit of whi it has control through the agencies established by the Central Exchange, and w consign all shipments through and by the Local Exchanges to some point at which t Central Exchange has representation. The agreement further provides that, if District Exchange fails to ship all its citrus fruits as provided, or disposes of all any of it elsewhere or otherwise than is provided, such District Exchange shall pay liquidated damages to the Central Exchange a sum of 25 cents per box on all frui disposed of in a manner contrary to the agreement.

The Central Exchange places bonded agents in the principal markets; it gathe full information of the conditions in each market; receives telegraphic advices of t sale of each car of fruit, and furnishes the information every day to the association it takes care of litigation that may arise in connection with marketing, and handl all claims; it conducts an extensive advertising campaign to popularise fruit an develop new markets.

With the information then at its disposal, each shipping agency may regulate i shipments, develop its own brands, use its own judgment as to when and in wh quantities and to what markets the fruit shall be shipped, and the price it willing to accept. There is no uniformity in price for different brands—eve brand sells on its own merits. The agent in the market acts directly under t orders of the shipper; the Central Exchange does not interfere, but is the mediu through which orders for fruit pass from the agent to the shipper. It furnishes su associations daily with information regarding general movements of cars, gener conditions of markets at different places, the prices at which all Exchange fruit sold, and such other information as will enable growers and shippers, through the associations and District Exchanges, to decide the questions of distribution f themselves.

The Exchange never contemplated the opening of wholesale or retail houses, but to put the fruit into the hands of legitimate dealers first hand. It established a system of agencies in all the principal cities of the country, employing capable and experienced agents. Most of these agents are salaried officers, and have no other business to engage their attention. They sell the fruit to smaller cities within their districts.

Over all these agencies are travelling agents, who have authority to supervise and check the work of the various agencies. These general agents maintain a bureau of information through which all agents receive every day detailed information as to sales of Exchange fruit in other markets on the previous day. This information enables the agents to fix prices, and if an agent is unable to sell at the average prices prevailing elsewhere, he promptly advises the head office, and sufficient fruit is diverted to other markets to restore normal prices. Approximately 40 per cent. of the fruit is sold by public auction, and the remainder privately at prevailing market rates. Through the agents the Exchange receives and transmits to its members trustworthy information regarding market conditions, visible supplies, &c.

Results of Combination.

The trade found it much more satisfactory to deal with a central body with representatives on the ground than to negotiate with individual shippers hundreds of miles away. The wholesale and retail merchant found that the fruit was more uniformly graded, more attractively packed, kept better, and was easier to sell; and that supplies came forward more regularly. To-day the Exchange has 10,500 growers, 200 packing associations, 20 District Exchanges, and 77 sales offices. From these sales offices the fruit is distributed to 2,500 wholesalers and 400,000 retailers.

To sum up the advantages of co-operative marketing, it is claimed that the packing and selling costs have been reduced by one-third, transportation charges have been reduced by 10 per cent., Customs duties on imported fruits have been put on a fair basis, the present-day large crop is successfully marketed, whereas thirty years ago a comparatively smaller crop was regarded as an over-supply, and consumers get better fruit at a lower price than ever before.

ACTIVITIES INCIDENTAL.

In addition to the sales staff, the Exchange has several other departments or branches which concentrate on special matters relating to its business. Some of the more important of these departments are—

The Advertising Department.

The public is particularly attentive now to sound information regarding diet and nutrition generally. Wide publication of facts regarding malnutrition or undernourishment of city children, due to deficiencies in diet, has focussed public attention on the relation of proper diet to health. Government agencies, teachers, and the medical profession are united in urging a greater use of fruit and vegetables. Last year coloured pages in leading national magazines, especially magazines appealing to the housewife, were the principal means of advertising the merits of citrus fruits. A feature which has also been developed is the sending to newspapers and magazines of interesting news material in connection with the industry. New recipes, facts on nutrition, current news of the industry, history of the Exchange, articles on selling, fruit displays, and stock turnover are typical subjects. Over 145,000 persons wrote requesting the Sunkist recipe-book and other booklets, which are distributed at cost.

Dealer Service.

Experienced men call on retail merchants, show them the importance of good displays, arrange special sales of fruit, distribute display material, and explain the wisdom of reasonable margins and quick turnover. Every practical sales idea and every successful display method gathered from several years' experience in working with the retail trade in all sections of the country are disseminated by these men, who are practically a clearing-house for practical ideas and methods. These men last year visited 12,000 retailers, and personally decorated 8,000 stores. Personal work is supplemented by a mail service, circulars and individual letters being used to interest the trade in the dealer service and to broadcast successful sales plans and ideas.

Fresh Fruit Drinks.

Last year the Exchange manufactured and sold to soda fountains 5,000 Sunkist fruit-juice extractors, thus introducing for the first time in a large way the service of fresh fruit drinks at the fountains. Hitherto the fountains generally have offered their

consumers orange and lemon drink substitutes made synthetically or from preserved concentrates, and the development of this field for marketing fresh fruit has awaited the perfection of a practical device for extracting fruit juice. A wide distribution of the new machine, together with proper advertising, will now create a new outlet for large quantities of citrus fruits.

Traffic and Claims.

This branch has secured material reductions in rail freights on car-loads of fruit and on orchard heaters railed from factories in the East. Claims for overcharge and loss and damage in transit amounting to 300,000 dollars were collected last year. The shortage of refrigerator cars is also receiving attention.

Law.

Keeps informed on and reports to the Directors important developments and trends in legislative matters pertaining to the co-operative movement and to agriculture in general. In addition to public policy questions affecting the organisation, members are kept fully informed regarding laws governing taxation in the various States and their interpretation by the Courts, trade mark infringements, welfare of employees, and employers' liability. Consideration is constantly given to Local Association questions of organisation and finance as well as to individual problems arising in the conduct of their affairs.

Field Department.

There is a well-organised Field Department experienced in the enforcement of regulations governing advertised brands. The organisation has clearly recognised its responsibility to the trade and the public, as well as to the growers, of fully maintaining the quality of its advertised brand, consequently that brand has never stood higher, nor has the confidence placed in fruit of that brand by the trade and the consumers been more merited. In addition to inspection work, the Field Department actively assists shippers in all problems relating to the handling of fruit and in making known to growers the advantages of co-operative marketing as conducted by the Exchange.

Pest Control Bureau.

In co-operation with the local, State, and national agencies, the Pest Control Bureau assists growers in adopting the most practical and effective control measures, and stimulates the development of better control generally. The Bureau also concerns itself with the enforcement of strict quarantine and other preventive measures against the ever-present danger of pests being introduced into the citrus districts.

Exchange Research Laboratory.

Investigates problems of a chemical nature connected with the citrus industry, and assists the by-product companies formed by Exchange growers in developing a profitable outlet for the increasing quantities of fruit not suitable for sale as fresh fruit.

Lemon Products Company.

Last year the company produced 12,000 lb. of lemon oil and 600,000 lb. of citric acid, the whole of which was sold. The capital of the company is 250,000 dollars, and the tangible assets 280,000 dollars. Since its organisation in 1915 the company has purchased from shippers cull lemons to the value of 400,000 dollars.

Orange Products Company.

The company operated by members to develop methods for the utilisation of oranges not suitable for shipment. A successful process has been put into operation for the recovery of oil of orange; very encouraging results have been attained in the manufacture of concentrated orange juice; and attention is being given to the manufacture of other products. During the two years of its existence the company has processed fruit at the rate of 1,200 tons per month, and this year it will be able to return to growers a creditable amount for a large volume of fruit which on account of damage by frost would otherwise have been practically useless.

Packing-house and Orchard Supplies Company.

A Fruit Growers' Supply Company has been organised to secure packing-house and orchard supplies. The authorised capital of the supply company is 6,000,000 dollars, of which over 4,000,000 has been paid in, and the remainder is being gradually collected from the growers at the rate of 2 cents (1d.) per box on their shipments through the Exchange. The company has two lumber plants to cut timber on the land purchased from the Government, and it is in a position, if need arise, to furnish the full requirements of growers for boxes from its own mills. In its purchases of the principal materials for use in the industry, it is directly in touch with the sources of supply, and with its large volume of purchases is in a position to secure such supplies for the growers at the lowest possible prices.

APPLICATION TO QUEENSLAND.

Some of the outstanding features of the Californian Fruit Growers' Exchange which are quite capable of adaptation to Queensland conditions are—

(1) The employment of salaried agents to concentrate on the marketing problems in various cities; to collect data as to supply and demand; to telegraph particulars as to prices obtained for Exchange fruit; and to do all in their power to extend the markets in their particular centres.

(2) The organisation of local packing associations for the grading and packing of fruit for market, and of district associations to act as the forwarding agents.

(3) The systematic attempt to provide for the orderly shipment of fruit to markets in sufficient quantities to meet the demand but not sufficient to cause over-supply.

(4) The formation of companies or trading societies for the treatment of fruits not up to standard grade, and of expert departments or branches to deal with special problems such as legal matters, claims, research, &c.

(5) The systematic advertising of standard products and other propaganda for encouraging the use of fruit in greater quantities.

SUGGESTIONS.

In its programme for 1923-24 the Council of Agriculture should be mainly concerned in the solution of problems connected with the harvesting, grading, packing, storage, transport, and marketing of produce; and in the arrangements for obtaining, at satisfactory prices, supplies required by producers. To enable the Queensland Producers' Association to carry out the functions as outlined it is suggested that—

(1) Its objects as defined in the Primary Producers' Organisation Act should be extended to include power to trade or to make arrangements with trading concerns for the conduct of its business.

(2) The Primary Products Pools Act should be amended to permit the Council, for co-ordination purposes, to have the right to nominate one member of each commodity board appointed under that Act.

Power to Trade.

The power to trade would not necessarily result in the establishment of a big trading concern controlled directly by the Council. It should be open to the Council to make arrangements with existing traders, firms, or companies for the conduct of its business, and it should be possible for the Council to co-ordinate the activities of existing farmers' co-operative companies or societies. The general scheme might be as follows:—

(1) The Council to act as a central administration directly controlling general matters such as organising, collection and distribution of data, and general supervision of marketing.

(2) Where existing farmers' trading societies can be amalgamated or improved upon under co-ordinated methods, the Council to try to effect such improvements and to secure representation on the directorates of such societies.

(3) Where satisfactory arrangements cannot be made with existing farmers' trading societies or other traders the Council to organise sectional trading societies to facilitate the harvesting, packing and grading, storage, transport, and marketing of products; the Council to be represented on the directorates of these trading societies for the purpose of co-ordinating effort.

The societies to adopt rules approved by the Council, and to register under "*The Industrial Provident Societies Act of* 1920" if considered practicable.

(*Note.*—"*The Industrial Provident Societies Act of* 1920" permits of registration of any trading society whose capital is restricted to £100 per member; and upon registration the society may engage in any trade operations permitted by its rules. In the interest of members the Registrar examines these rules prior to registration to ensure that proper safeguards have been made.)

(4) The District Councils and Local Producers' Associations and District Agents to act as media through which the Council obtains data as to production, organises the societies mentioned, and supplies information to growers.

Under such a scheme there may come into operation—

(*a*) A number of societies for the purpose of co-operative handling of products and preparing them for markets. Such societies might include—

Local or district co-operative grading and packing and storage sheds.
Local or district societies for conservation of fodder.
Local or district herd testing societies.
Local or district societies for joint purchase of high-power machines, harvesters, cultivators, transport wagons, tractors, pure bred sires, &c.

(*b*) An organised system of collecting and distributing market information to enable such societies to ship to the best markets and in such quantities as will facilitate the sale of the produce.

Marketing of Fruit.

It is suggested that the Council of Agriculture should forthwith try to organise the marketing of fruit, and that the following scheme in regard to procedure to be adopted should be extended to other commodities so far as that procedure can be applied:—

(1) That in connection with the marketing of fruit the Council of Agriculture take steps forthwith to extend as far as possible the existing local markets and to discover new markets within the State.

(2) That for the purposes of (1) each District Agent be required to act as a markets officer for his district and to keep the Council advised as far as possible of stocks in sight, ruling market prices, movement of products, markets over-supplied or under-supplied, &c.

(3) That subagents be appointed, on terms to be arranged by the Council, to assist the District Agent in collecting the data. For example, in the Rockhampton district the District Agent would be responsible for the town of Rockhampton, but he might have a subagent at Mount Morgan, one at Gladstone, and one in such other centres as may be arranged, to collect for him (for transmission to the Council through him) the data at such subcentres.

(4) That on receipt of such data the Council cause it to be tabulated and supplied forthwith to the recognised co-operative associations which are working in conjunction with the Council.

(5) That on receipt of the particulars furnished by the Council these associations arrange for the necessary supplies to be forwarded through their agencies to the centres concerned.

(6) That to ensure that good fruit shall be forwarded and that satisfactory markets may be established and maintained standard grades and packs be determined.

(7) That the standards be determined by a duly appointed conference consisting of representatives of the Department of Agriculture, Council of Agriculture, the recoginsed societies, the producers, and the trade.

(8) That if produce of a standard inferior to the prescribed standard be forwarded by a producer, such producer be warned that he will be debarred from participating further in this scheme of distribution.

(9) That centres be encouraged to pool their produce and to try to establish a recognised brand for that centre, which will become known in the markets of the State by its uniformly good quality.

(10) That for the purposes of this scheme District Councils, District Agents, and Local Producers' Associations in so far as they are concerned be urged to organise their districts.

(11) That an organised scheme of advertising and sales methods be instituted to encourage the trade and the consumers to buy standard grades of fruit.

(12) That in due course the Australian markets be organised by the Council of Agriculture in similar manner.

(13) That, should it be found in due course that the Queensland and Australian markets are unable to absorb the whole of the produce, steps be taken by the Council to find outside markets.

(14) That the best possible provision be made with the help of the Agricultural Department and the Queensland University for the treatment and utilisation of inferior grades of fruit.

(15) That upon the finding of any commercial process or treatment for such fruits co-operative societies be formed for the handling of the work.

(16) That the question of establishing co-operative societies or a central co-operative society for the purchase of orchard or packing requirements be fully considered.

[The proposals for the extension of powers of the Council and the suggestions for the marketing of fruit have already been referred to the Council of Agriculture and adopted.—ED.]

GRADE SPECIFICATIONS.

ORANGES.

Following are the grade specifications of the California Fruit Growers' Exchange referred to in the foregoing article:—

Sunkist.

Mature oranges of one variety; of good eating quality; well-grown specimens of normal form, picked from the tree; of good colour for the variety; of good texture; excluding rough, coarse, more than slightly puffed, more than slightly scarred, more than slightly sunburned, or misshapen fruit, or dirty fruit, making it uninviting in appearance to the consumer; substantially free from scale, other insect or fungus diseases, splits, or defects of any kind that cause fruit to decay; excluding fruit showing effects of frost or which cuts dry for any other reason. Oranges packed under the Sunkist brand shall not vary more than 10 per centum below the foregoing specifications, except as provided in the special rule relating to frosted or dry fruit.

Red Ball Oranges.

Mature oranges of one variety; of good eating quality; well-grown specimens of fair form, picked from the tree; of fair colour for the variety; of fair texture; excluding badly sunburned, very rough, very coarse, badly puffed, badly scarred fruit or fruit so scaly as to make it uninviting in appearance to the consumer; substantially free from other insect or fungus diseases, splits or defects of any kind that cause fruit to decay; excluding fruit showing effects of frost or which cuts dry for any other reason. Oranges packed under this grade shall not vary more than 5 per centum below foregoing specifications.

LEMONS.

Sunkist.

Lemons, well-grown specimens of normal form; excluding fruit with abnormally long necks; of good uniform colour; excluding fruit more than slightly sunburned or more than slightly green in colour; of good texture; excluding rough, coarse fruit, and fruit with deep dark scars, or dirty fruit, making it uninviting to the consumer; substantially free from scale, other insect or fungus diseases or defects of any kind that cause fruit to decay; excluding spongy, hollow centre fruit and fruit affected with interior decline, blossom end decay, or fruit showing effects of frost or which cuts dry for any other reason. Lemons packed under the Sunkist brand shall not vary more than 10 per centum below foregoing specifications, except as provided in the special rule relating to frosted and dry fruit.

Certified Choice.

Lemons, well-grown specimens of fair form, of fairly uniform colour; excluding fruit badly sunburned or very green in colour; of fair texture; excluding very rough, very coarse, badly scarred, dirty fuit, fruit so scaly as to make it uninviting in appearance to the consumer substantially free from other insect or fungus diseases or defects of any kind that cause fruit to decay, excluding very spongy or badly hollow-centre fruit and fruit affected with interior decline, blossom end decay, or fruit showing effects of frost, or which for any other reason cuts dry. Lemons packed under this grade shall not vary more than 5 per centum below foregoing specifications.

Special Rule Relating to Frosted and Dry Fruit.

No oranges, lemons, or grapefruit shall be shipped under the Sunkist brand or the Certified Choice brands, if the shipment contains fruit, in excess of 5 per cent., showing effects of frost, or which cuts dry for any other reason.

Special Rule Relating to Wrapping.

All oranges, lemons, and grapefruit, with the exception of tangerines and mandarins, packed under the Sunkist brand must be wrapped in paper wraps on which is printed the Sunkist brand design or trade mark. Oranges, 252's and smaller, may be packed under the Sunkist brand without wrapping.

Special Rule Relating to Maturity of Navels and Valencias.

Navel and Valencia oranges shall be considered immature if the juice does not contain soluble solids equal to or in excess of eight parts to every part of acid contained in the juice, the acidity of the juice to be calculated as citric acid without water of crystallisation.

Special Rule Relating to Compliance with Federal and State Laws.

No fruit, oranges, lemons, or grapefruit, will be handled by the C.F.G.E. under any brand or grade, or at all, unless the same shall in all respects conform to the laws of the State of California, and, if the sale is made in interstate commerce, to Federal laws, and to the laws of the place where the fruit is sold. The Field Department shall inspect all grades of citrus fruit shipped through the C.F.G.E., and shall in every way endeavour to make uniform the enforcement of the laws concerning the shipment of California citrus fruit.

Enforcement of Grade Specifications.

The enforcement of the grade specifications is lodged with the Field Department of the C.F.G.E. The Field Department shall determine whether the fruit being packed for shipment complies with the grade specifications, and, furthermore, shall be charged with the authority to compel repacking of the fruit in case it is not up to grade specifications.

If any member of the Field Department finds fruit that, in his opinion, is below the specifications adopted, he shall immediately take the matter up with the shipper or the manager of the Association. If they cannot agree, then the manager of the District Exchange and the supervising inspector shall be called into consultation. In case these cannot agree, the manager of the Field Department shall be called in and his decision shall be final. It is understood, of course, that if any shipper feels that the manager of the Field Department has erred in his judgment, he may properly bring the matter before the management of the C.F.G.E.

Method of Listing Certified Choice Brands.

Each association wishing to abide by the specifications formulated for choice grade shall designate the brand or brands under which it will ship fruit that conforms to the specifications governing choice, and which will be subject to grade inspection by the Field Department. A list of certified choice brands will be forwarded to all district managers, who will be advised that these brands are being packed in accordance with the choice grade specifications, and are subject to grade inspection by the Field Department.

Penalties for Violating Sunkist Grade Specifications.

It is the policy of the C.F.G.E., as the owner of the trade mark "Sunkist," that in case of the persistent misgrading of fruit for shipment under this brand that the Exchange will not distribute any fruit of such association under such trade mark, and all shippers, division managers, district managers, and the advertising department shall be notified to such effect.

Penalties for Violating Choice Grade Specifications.

It shall be the policy of the C.F.G.E., in case of the persistent misgrading of fruit under the specifications governing choice, to withdraw the shipper's brand from the certified list, and all shippers, division and district managers shall be notified to such effect.

THE FUTURE OF THE SUGAR INDUSTRY.

QUEENSLAND DELEGATION IN MELBOURNE.

On Friday, 2nd March, representatives of the Queensland Sugar Industry, appointed as a delegation from the recent Sugar Conference in Brisbane, met the Prime Minister, Hon. S. M. Bruce, M.C., in Melbourne, and discussed with him urgent matters affecting the future of the Sugar Industry. The Minister for Agriculture and Stock, Hon. W. N. Gillies, led the delegation, and pressed for a renewal of the existing agreement under which the industry has become substantially stabilised. Points in favour of renewing the agreement or adopting the submitted tariff alternative were stressed strongly by members of the delegation, who represented every section of the sugar industry.

The Prime Minister, in the course of his reply, stated that the Federal Government realised fully the value of the industry both nationally and economically; he held out no hope for the renewal of the agreement, but promised that the industry would be safeguarded fiscally. The proceedings in Melbourne are reported fully hereunder.—Ed.

A delegation from the Sugar Conference held in Brisbane recently, and representing the various sugar interests of the Commonwealth, waited on the Prime Minister, Hon. S. M. Bruce, M.C., at Melbourne, on Friday, 2nd March. The delegation was introduced by Senator T. Givens (Q.).

ADDRESS BY MR. W. N. GILLIES.

Hon. W. N. Gillies, Minister for Agriculture in Queensland, was the first speaker. He said: The gentlemen now before you have been appointed as a delegation from a Conference called by the Queensland Government representative of the sugar industry of Queensland, and with them are two representatives of the industry in New South Wales.

My Government was keenly disappointed when the Federal Parliament dissolved without dealing with our request for a renewal of the Sugar Purchase Agreement. The small increase in the tariff we could not regard as a satisfactory alternative. The Conference referred to was called immediately after the Federal elections, and, as you are aware, no time has been lost in pressing for this interview, the object being to place our case in your hands before your Government formulates a sugar policy. As you had agreed to receive this deputation, we were disappointed keenly to hear your statement in Parliament yesterday against a renewal of the Sugar Purchase Agreement, because our mission is to urge upon your Government the consideration of the following resolution:—

> "That in view of the fact that the effect of the current Sugar Agreement has been to substantially assist to stabilise the industry, and having regard also to the very great importance which the industry is economically, industrially, and nationally to the Commonwealth as a whole, and to the States of Queensland and New South Wales in particular, this Conference strongly urges upon the Commonwealth and State Governments the urgent necessity of renewing the Agreement, at the same price, for a period of five years."

That is, we undertake to continue to supply the Commonwealth for a further five years, with 94 net titre sugar, as hitherto, at 3¼d. per lb.

We are fully aware of the hostility of certain powerful newspapers in the South, who, through ignorance of the facts or because of their failure to outgrow opinions formed or policies advocated in pre-Federal days, oppose bitterly a continuance of the present Sugar Agreement.

National Security Ensured by Sugar.

To me it was not a matter of wonder in pre-Federal days that people in the South, who believed in the ideal of White Australia and knew the history of America, should regard the Queensland Sugar Industry, with its kanaka labour and large plantations, as something of a menace; but it is surprising that there are Australians to-day who do not realise that White Australia has passed from an ideal to an actuality through the agency of the sugar industry, that both the kanaka and the large plantations have long since disappeared, and that in their stead are small farms owned and worked almost exclusively by men of their own colour, race, and ideals; and this industry to-day, far from becoming a menace, has become the greatest bulwark of our national safety.

Australia is the one country in the world to-day that grows sugar-cane successfully and manufactures it into sugar by white labour and under white labour conditions, while the sugar industry is the only industry suitable for our thousand miles of tropical coastal lands, the most vulnerable part of Australia.

What the Federal Royal Commission on Sugar Said.

The Royal Commission appointed by the Federal Government in 1911 did the sugar industry and Australia a great service by presenting to the public many important truths. Had that report been carefully studied, even by newspaper men and politicians, the present hostility would not now exist.

The Commission said, and we wish to emphasise those views to-day:—

> "Unsettled areas in the tropical parts of Australia are not only a source of strategic weakness; they constitute a positive temptation to Asiatic invasion. The ultimate, and, in our opinion, the effective justification of the protection of the sugar industry lies beyond the question of industry or wealth production. It must be sought in the very existence of Australia as a nation."

The Sugar Industry and National Defence.

We say emphatically that in the defence of this Continent and the maintenance of White Australia, the preservation and advancement of the Queensland Sugar Industry are involved. We believe that the industry can only be maintained and extended so as to provide all the sugar Australia requires, by one or other of the methods now advocated.

According to Press reports a few days ago, you were speaking on defence and the importance of the Navy. Battleships are necessary; but is not a girdle of white settlers round Australia, producing an important article of diet, equally valuable? The new sugar-mill, costing half a million, about to be erected by the Queensland Government to open up the jungle lands of the Tully River is as good an investment for defence as a modern battleship, for it will settle men there who will be ready to fight if needed. I am right in saying that the first Contingent to leave the mainland during the late war was despatched from Townsville, North Queensland, going to Papua and Thursday Island.

The Queensland Government has invested in mills one and a-quarter million sterling. We are spending two millions in completing the North Coast Railway, which, with the settlement that the sugar industry alone can maintain, will be of great value in case of a threatened invasion; but, of course, such railways without the settlers would be an advantage to the invader.

Australia Should be Self-contained.

Our second great claim for your consideration is that Australia should be self-contained. We can, and should, produce all we require, not only for the present population of five and a-half millions, but for a population of fifty millions.

The Queensland Government and the Industry—Beneficial Effects of Stabilisation.

I have mentioned that the Queensland Government has large sums invested in sugar-mills and railways in sugar districts. Notwithstanding this, our greatest concern is for the grower and the worker in the tropics. We have passed legislation to encourage and protect those two sections in so far as State legislation can do that. Neither the need for this legislation nor the history of the early hardships of those engaged in canegrowing need be gone into now; but I want to say that, generally speaking, prior to the present system of control the grower did not receive

a price for his cane which enabled him to pay decent wages, live and keep his family in a moderate degree of comfort, and at the same time return to the soil in the form of manure some of that which he took away from it. Whereas, during the last three years, under the agreement the industry has been stabilised, the grower has received a price for his labour which encouraged him to clear and plant further areas, and to manure and better cultivate existing fields. The increased area in 1921 was 40,000 acres, and at the same time the manufacturer was enabled to install much-needed new machinery to bring his mill to a better state of efficiency, over one million sterling having been expended by the millers during the last three years for this purpose.

For the first time in the history of the industry those engaged in it knew where they stood for at least three years. The term was altogether too short, for it should be realised that felling, burning, and clearing Northern scrub lands is slow and expensive work.

Sugar-cane, unlike many crops, remains in the ground from three to six years, while a modern sugar-mill, with a tramway system complete, costs anything up to half a million sterling.

Room for Expansion in Queensland.

We have hundreds of thousands of acres of land with climate and rainfall suitable for sugar-growing equal to that in any part of the world, and this is a point worth remembering, quite apart from the vital question of keeping our Northern coastal belt peopled from a defence point of view. You will perhaps be surprised to know that during the seasons 1915 to 1920 Australia spent sixteen and three-quarter millions sterling in importing sugar, excluding duty, and that the price for these importations was £9 7s. 6d. per ton higher than that paid to the local producer under the present Agreement.

Stability and Security Ensure the Cheapest and Best.

The immediate advantage to Australia resultant from the present Agreement is that we are now producing in Australia all the sugar that Australia requires. We guarantee to do that if the Agreement is renewed at the reasonable price to the consumer as set out in the resolutions.

It can be shown that, while the present system of control has been advantageous to the producers by giving stability and security to the industry during the period, the Australian consumer received the cheapest and the best sugar in the world.

An Illuminating Comparison.

A comparison of the world's prices, which I furnish herewith, shows that the Australian public, under the present system of control, saved twenty-five millions sterling, as against paying world's parity prices. At the time of entering into the present Agreement to sell our raws at £30 6s. 8d. per ton, Mr. Hughes said that the cost of importing a similar article was over £60 per ton. It was the comparative cheapness of Australian-grown sugar under this system of control which enabled the Australian manufacturers to export articles made from or containing sugar to the value of over seventeen millions sterling.

In the light of these figures, I am not surprised that Sir Henry Jones, in writing to the Australian Sugar Producers' Association, under date 6th April, 1921, should say:—

> "We are not up against the Australian sugar industry. We know quite well that we must pay a price that will enable the sugar to be grown by white labour, and we are quite willing to do this. In so far as the Australian market is concerned, it does not matter to us what we pay for sugar. As regards the export market, we are absolutely in agreement with the motion that was passed at your meeting concerning rebates on imported sugar required for manufacturing purposes and re-exported in manufactured form. An arrangement such as this would, undoubtedly, be of very great assistance to the Australian fruitgrowers. We think efforts should be made to enable the fruitgrowing industry and the sugar industry to be carried on in harmony, each to help the other, and we see no reason why these two great industries should not be carried on side by side—let them live and let live."

The following table (figures compiled from "International Sugar Journal," England) shows the comparative prices in Australia and England:—

	Australia.	England.
1915	£25 ..	£27 to £32 per ton
1916	£29 5s. ..	£34 to £41 per ton
1917	£29 5s. ..	£46 15s. per ton
1918	£29 5s. ..	£57 15s. per ton
1919	£29 5s. ..	£57 15s. to £66 per ton
1920	£49 ..	£66 to £160 per ton

Australian sugar covering all charges.

This delegation agrees with those sentiments entirely. We believe the two industries should work in harmony and, above all, that Australia should be self-supporting.

There are many other important facts concerning both manufacturer and grower that delegates will put before you, but I again emphasise the fact that in the preservation and expansion of the sugar-cane industry of Queensland lies the maintenance of White Australia, and, as already stated, to a very great extent, the defence of Australia.

"We say emphatically that in the defence of this Continent and the maintenance of White Australia the preservation and advancement of the Queensland Sugar Industry are involved. We believe that the industry can only be maintained and extended so as to provide all the sugar Australia requires by one or other of the methods now advocated.

"According to Press reports, a few days ago you were speaking on defence and the importance of the Navy. Battleships are necessary, but is not a girdle of white settlers round Australia . . . . equally valuable?

"The new sugar-mill, costing half-a-millon, about to be erected by the Queensland Government to open up the jungle lands of the Tully River, is as good an investment for defence as a modern battleship, for it will settle men there who will be ready to fight if needed.

"I am right in saying that the first Contingent to leave the mainland in the late war was despatched from Townsville."—*Hon. W. N. Gillies to the Prime Minister* (*Hon. S. M. Bruce, M.C.*), *in the course of his* (*Mr. Gillies'*) *advocacy of Commonwealth consideration for the Sugar Industry at Melbourne, on 2nd March.*

Unity of All Sections.

I am aware that there are differences of opinion regarding the policy of Government or State control of industry, but the delegation before you is made up of all shades of political thought, and it is at one on this question as far as the sugar industry is concerned. Several members of your Government have said time and again that the circumstances of the sugar industry are such that this form of Government control is absolutely necessary.

In conclusion, I desire to respectfully press for an early consideration of the whole question, for the present Agreement is to all intents and purposes at an end so far as the producers are concerned. The crushing season will start very soon, and there is a general feeling of uncertainty in the minds of those engaged in the industry as to their future.

Unacceptable Proposal—Risk of Fiscal Failure.

With regard to your statement that a special tribunal for the sugar industry would be appointed to determine rates of duty, and setting out other conditions, I can assure you that such proposals are not acceptable to the delegates, nor to a

single Queensland member of the Federal Parliament, for all those who are familiar with the ramifications of the industry know that to simply erect a tariff wall is not to give protection to either producer or consumer. If your statement yesterday is your final word *re* the Agreement—and I hope it is not—then let me urge on you the favourable consideration of the alternative scheme set out in the attached resolutions.

An Alternative Scheme.

This scheme, while guaranteeing the consumer 1A refined sugar at 4¾d. per lb., relieves the Commonwealth Government of any financial obligation. The delegates, whilst anxious to return, are prepared to remain in Melbourne whatever time is necessary to suit your convenience.

THE SUGAR PRODUCERS' VIEWPOINT.

The Merits of the Agreement and Its Justification.

Mr. G. H. Pritchard, Secretary of the Australian Sugar Producers' Association, said that Mr. Gillies had stated the foundation of their case, especially directing his remarks to the national importance of the industry, and with reference to the resolutions carried in Brisbane, the speaker proposed to deal with these remarks seriatum. He would endeavour to show the merits of the Agreement and to establish a complete justification for it. There were two cardinal points to be kept in view, first to stablise the industry, and secondly to stimulate production. This had been the original idea when the Agreement was brought before the present Prime Minister's predecessor, and he was glad to be able to say to-day that both of these desirable objectives had been conspicuously achieved. He desired to point out, however, that the circumstances obtaining in regard to the Sugar Agreement were somewhat different to those obtaining in regard to any other thing. In the first place they had the Sugar Acquisition Act under which the Queensland Government acquired the whole of the sugar produced in the State. Secondly, they had the Regulation of Sugar Cane Prices Act which fixed the price of cane. They had the Industrial Arbitration Act and the Industrial Arbitration Court under which is fixed matters relating to labour, and the conditions under which the workers perform. There was also the Workers' Accommodation Act. It was quite realised that some of the industries had some of these component governing statutes, but he did not know any one which had them all. It seemed to him, therefore, that so long as those statutes existed the raw sugar miller should know where he stood.

How the Consumers are Protected Under the Existing Agreement.

He also wished to point out that Government intervention was initiated to protect the consumer. In 1920, they sold their sugar to the Commonwealth for £49 a ton, while the price in Cuba two months later in the same year was £137 10s. As a further evidence of the good bargain this was to the consumers of Australia the Customs records would show that in 1920, 100,000 tons of sugar were imported, which cost the Commonwealth £60 a ton, and in 1921, 84,470 tons which cost £36 15s. 8d., without duty—because after the Agreement was made he understood the Government suspended the charging of duty—therefore he thought that with these figures standing out like a beacon light it could not be contested that when the Prime Minister made this Agreement he did an eminently good thing for the consumers of Australia, and he really did not think that there could be a more emphatic endorsement of the foresight and wisdom of Mr. Hughes in making this Agreement than this.

The Voluntary Sugar Pool Proposal.

Regarding the resolutions at the Brisbane Conference, the first proposal was that a sugar pool be established for a period of five years—a voluntary pool and not a compulsory one. As the Commonwealth Government had done much to assist other industries by way of pools, it seemed only reasonable to assume it would be favourably disposed to regard any proposal in connection with the sugar industry.

The second resolution was a machinery one only by which the sugar would be acquired—also to make provision to include New South Wales sugar in the pool; and there should be no difficulty in the Colonial Sugar Refining Company bringing in the product of their three mills. Resolutions Nos. 3 and 4 were the ones which concerned the Commonwealth directly.

No. 3.—While the pool is in operation, the Commonwealth Government to prohibit the importation of black-grown sugar except so much as is required from time to time as determined by the pool to make good any Australian shortage; this embargo to be applied subject to conditions stated in Clause 4 relating to price to be charged to the consumers.

No. 4.—During the currency of the pool 1A refined sugar to be sold at such a price as will ensure that the retail price of refined sugar to the consumer shall not exceed 4¾d. per lb. in capital cities.

Continuance of Tariff Protection.—Safeguarding Consumers.

They were asking for a continuation of the existing embargo against the importation of black-grown sugar, and that produced under black-labour conditions. In exchange for that concession they undertook that 1A refined sugar would be produced so that it could be retailed at a price of not more than 4¾d. per lb. They were prepared to give that safeguard, and it therefore appeared to him that they were putting up a perfectly sound and proper proposition. He would submit that while their undertaking ran concurrently with the embargo the Commonwealth Government ran no risk whatever. If they failed the embargo could be removed. They were producing all the sugar that was required for the consumption of the Commonwealth, and were thus saving the money value of that sugar getting out of the country. The chief overseas source of sugar was Java, and the Commonwealth had very little trade with Java, and consequently any sugar purchased from them meant a trade balance against us. The speaker then went on to refer to the poisonous remarks passed by the Melbourne Press. The interests which he represented, however, were asking for no concession whatever, neither did they desire any financial aid from the Government. They would provide all the necessary machinery. This he considered made a conspicuous difference between the present and many other schemes put forward. He desired to labour this. He did not find anybody else outside Melbourne saying the things that appeared in the Melbourne Press—they were not true.

Queensland's Greatest Agricultural Interest.—An Australian Industry.

In conclusion, Mr. Pritchard emphasised the fact that the sugar industry was one of the greatest possessed by Queensland. Summarising the position he said that it was an Australian industry pure and simple. There never had been a more pronounced national note struck than by the Commission appointed in 1911. The salient features of this were: Burden of the White Australia policy had practically been borne by the sugar people in Queensland; it was the only industry which was successful in the tropical north. It had been pointed out that the wages in the sugar industry were £6,000,000 per annum. The production of sugar had been a great factor in building up industries connected with jams, fruits, milk, &c., the exports of which had amounted to £17,000,000 per annum. Before the war these had been infinitesimal in comparison, and this was because sugar could be supplied to the manufacturers in Australia at a cost which enabled them to compete in the world's markets—in Britain, America, and India, with the Governments of which countries they had contracts. The Sugar Agreement had certainly achieved this purpose. Australia produced all the sugar required for home or export trade. The producer received only 3¼d. for his sugar, which was a very necessary thing to remember. They had been blamed for sugar being 5d. per lb., but the difficulties were not realised, and the price could be easily justified. The value of the Australian output of sugar last year was £9,000,000. If that were taken as an annual income and capitalised at 5 per cent. it would represent the vast sum of £180,000,000, thus illustrating the great benefits to Australia in more ways than one. It was estimated that more than 100,000 persons depended upon the industry, and over 20,000 men were employed. The capital invested amounted to £16,000,000—£6,500,000 for land and improvements, £6,000,000 for machinery, and £3,500,000 for refineries, not including the necessary working capital; he wished to emphasise this fact also. To erect and equip a new mill cost in round figures £500,000; this was a very different thing to a butter factory. There was this difference in particular—*i.e.*, that once you spent such a large sum of money it was there and you could not shift it. If the sugar industry were destroyed it would be so much scrap iron. Further, Australia was the only country where sugar was produced by white labour.

The Domestic Aspect.

Regarding the high price of sugar, the weekly domestic expenditure on sugar was less than any other leading item of food in the family budget. Mr. Piddington, after investigation, had given it that 5½ lb. was necessary for a man and his wife and family of three. Even on the old price that was 2s. 9d. a week; 6d. per week could now be taken off that. He could not but think that a lot of this complaint about the price of sugar was simply passed from mouth to mouth without any serious analysis of what it really meant, and was becoming a sort of catch cry. Mr. Gillies had told them of the immense advantage to Australia through having the sugar industry here that could not be refuted. Between 1915 and 1920 the comparative prices of sugar in Australia and England (from figures taken from the Royal Commission on sugar—"International Sugar Journal") were as under:—

	Australia.	England.
1915	£25 ..	£27 to £32 per ton
1916	£29 5s. ..	£34 to £41 per ton
1917	£29 5s. ..	£46 15s. per ton
1918	£29 5s. ..	£57 15s. per ton
1919	£29 5s. ..	£57 15s. to £66 per ton
1920	£49 ..	£66 to £160 per ton

Australian sugar covering all charges.

Assuming that the Australian consumption was 180,000 tons a year, Australia saved £25,000,000.

Thriving Queensland Towns Supported by Sugar Industry.

There was one other fact, that a number of really important towns depend solely for their existence upon the sugar industry. The speaker remembered Dr. Earle Page having been reported in the paper to have said that during his tour through Queensland that fact had struck him very forcibly. There was Bundaberg and Mackay. The latter had nothing else but the sugar industry and Bundaberg was practically similar. These were two cities typical of many smaller ones.

Home Markets.

There was another feature to which he specially desired to invite attention. Sir Henry Jones had said that he found the Australian market was the very best market for his jams, and he, the speaker, wished to remind them that Queensland, and particularly North Queensland, was one of the finest markets for the goods produced in the Southern States. He had there a leaflet from the Royal Show last September, showing the "Wyreema" working at the wharf discharging cargo from the Southern States and loading sugar to be sent to these States from Queensland.

Immigration and Decentralisation.

The Prime Minister and his colleagues he was sure understood the position and could assist them. It would help solve the immigration problem, and in that way it was a magnificent adjunct in considering the policy of populating this large continent. Queensland stood behind the sugar industry in every shape and form, and he was sure would rejoice if it heard that they had been able to arrange terms satisfactory to the sugar producer.

THE CASE FOR THE CANEGROWERS.

A Pre-Federation Promise.

Mr. T. A. Powell, President of the United Canegrowers' Association, expressed regret that the Government had decided not to renew the Sugar Agreement. He would like to congratulate the Prime Minister upon the published reports of his recent utterances, expressing his sentiments regarding the White Australia policy. He might also remind him of the fact that when the framers of the Constitution asked the people of Queensland to come into the federation it was on the express understanding that Queensland's interests regarding the sugar industry would be protected. Also, it was the vote of the sugar representatives of Queensland that enabled federation to be brought about; he therefore hoped that the people of the Southern States could be relied upon to stand to the contract that was entered into in years gone by.

Holding the North.—National Security.

He further referred to the fact that according to the last census the population of Herbert had increased by 15,000 people, and also that they had thousands and thousands of acres of good land in Queensland that was simply crying out for population. Further, that within a few days' sail there were millions and millions of coloured races merely waiting an opportunity to come along, and that if the people in the South had everything they wanted they should also see that the people in the North received a fair deal. The sugar industry was a unique one—there was only one purchaser. It was not, for instance, the same as the wheatgrower; they had to send their cane to the mill to be crushed and manufactured into sugar. He would like to read an extract taken from the report of the 1912 Commission—

> "The supreme justification for the protection of the sugar industry is the part that the industry has contributed and will, we hope, continue to contribute to the settlement and defence of the Northern parts of the Australian Continent."

A Fair Deal Desired.

When Mr. Hughes was approached in 1920 for the present Agreement, one of the questions had been that if he granted the Agreement could they supply the Commonwealth requirements. They had told him they could, and it was the first time in the existence of the industry that canegrowers had had a fair deal. The land had since then been taken up by settlers. The railway line had just been completed from Rockhampton to Mackay. He had on one occasion seen one of the settlers and his wife carting cane to the railway in a waggonette and buggy. He did not think it fair for any Government to do anything that would injure a class of people like this, as they were the class we wanted in Australia, and they wanted to get on as a white nation. All they asked for was a fair deal. The speaker also referred to the other industries depending on sugar. He hoped the Prime Minister would take this into consideration, also all the other points which had been put to him. They urgently desired early consideration of the question, and a decision as soon as it could possibly be given.

The Financial Risk of Altered Conditions.

Mr. Alexander Innes, Chairman of the Mackay Sugar Producers' Association, said that since 1915 the Queensland sugar crop had been acquired by the Queensland Government and passed on to the Federal Government, who had dealt with it throughout—as regards finance, &c.; that covered a seven years' period. The termination of the Agreement would bring into force again a complete set of new conditions. The financing of the industry was done by the sugar mills, and the extent to which this obtained could be judged from the fact that from the commencement of this year from 25 per cent. to 30 per cent. of the growers had applied for an advance. For the first two months of the year £2,000,000 had been advanced by one institution—this was apart from the sums they had advanced as fixed sums to the mills and other institutions. With these new conditions coming into operation it was necessary for them to know as millers where they stood. On behalf of the millers and growers, he would ask the Prime Minister to give as early a reply as possible. In reply to the Prime Minister, the speaker said that the £2,000,000 referred to was for current crop requirements and for mill requirements, and apart from permanent advances.

The Uniqueness of the Industry and the Question of Tariff Protection.

Mr. W. H. Doherty, Secretary of the United Canegrowers' Association, emphasised one or two points touched upon by previous speakers. In particular that of Mr. Gillies's remarks *re* the uniqueness of the Queensland sugar industry's position as compared to other Australian agricultural industries. He had heard the previous day the Prime Minister in Parliament say that he was prepared to give the industry adequate protection. They could not accept any amount of tariff protection as an adequate protection to the sugar industry, as it was here that the uniqueness of the position became apparent. In other agricultural industries, when, as with the farmer, there were droughts, he obtained the benefit of that rise; in the sugar industry they had no corresponding rise. If during the present year they produced half of the sugar requirements, the price would not be increased for the reason that they had black-grown sugar imported into this country to make up the shortage. That was one of the serious phases of the industry. It was evident that, although production in such an event would decrease, the cost of producing would

be just as great, or possibly greater than if they had an average crop. In a year of under-production, if there was no supervision over the importation of sugar, the temptation was to import sugar as required. If in the following year as much sugar as was required was produced in Australia it would be our sugar and not the imported sugar that would be carried over.

Royal Commission's Report.—Growers' Inadequate Profits.

With regard to some form of supervision, he would read a few remarks by the Royal Commission of 1912 in their report:—

> "Unfortunately, when we come to the growers we find a very different story. While the millers and refiners make handsome profits, the profits of the growers as a class are inadequate. A proportion of the growers as growers do well. The character and situation of the land, the price which was paid for the land, good fortune as regards seasonable rainfall and immunity from pests, floods, or cyclones, the exceptional ability or industry of the grower himself, or the employment by the grower of members of his own family—all or any of these may operate, and have operated, in favour of particular growers to secure good results. But the growers as a class do not, in our opinion, receive their fair share of the profits of the industry as a whole. Nor do they receive that adequate return on their capital outlay which it should be one object of a protective system to ensure. On careful analysis of the evidence submitted by the growers, the large majority were at one in maintaining that an increase in the price of cane was imperative."

That report, of course, was given in 1912, and while it stated there that the millers and refiners had handsome profits, since then the profits had been reasonable and fair, and they wished that condition of affairs to continue.

The Risk of Retrogression.

He also wished to point out that if they had to rely on a duty they would be going back to the condition of things existing at the time that Commission took its evidence. Sugar was then at the lowest price on the world's markets. They did not wish to go back to that condition of things, because it placed the grower in the position that he did not know where he was. The objection to a fixed tariff was that they had a fluctuating price for cane—one year perhaps the price was adequate and next year possibly the price might fall £10 a ton. Their cane had to fall in proportion, and it had been grown by labour that had been fixed at a price when cane was at a decent price. It was not in any way on the same basis as other Australian industries.

The Viewpoint of New South Wales Growers.

Mr. B. McDonough, representing the growers of New South Wales, said that the interests of the northern part of New South Wales were practically identical with those of Queensland, and an agreement entered into by the people of Queensland would be acceptable to those of New South Wales. During the currency of the present Agreement was the only time the growers had enjoyed any form of prosperity. His people would be very disappointed if some assistance were not given by the Government. He also would be disappointed, as at the present time they were spending a lot of money in their district; for this reason they would be glad of early consideration of the matter.

THE PRIME MINISTER'S REPLY.

The Prime Minister, in reply, said that he realised the deputation had come a very long way to see him and to place their views before him as representatives of the Government. In view of that fact, he was following a somewhat unusual course. As Mr. Gillies had pointed out, when a Government had a vote of censure over its head it was generally considered more correct that it should not receive deputations or take any action whatever. In this case, however, he thought perhaps it was only right he should see them and give them an opportunity of placing the position before him as they saw it. There were no members of Parliament present other than the President, who introduced the deputation, but he thought it was only fair to the members of the Federal Parliament to point out that there was a generally expressed desire on their part to attend, and it was at his request solely that they were not present. It was only necessary to have it introduced and then they could set out their case.

The Industry, an Australian Asset.

With regard to what they had said, there was a great deal which went to show the value of the sugar industry to Australia. He and his Government fully realised that it was imperative it should be carried on and should prosper. In the speeches made they had also given a great number of facts as to the value of the Agreement terminating on 30th June, both to the industry and to the people of Australia generally. Some remarks were also made as to the poisonous remarks that were being made in the Press in the South regarding the industry. They need have no apprehension as to the Government being influenced by comments of this character. They could take his assurance, and he would also tell them that, during the recent campaign for his own part—he did the Southern States, mainly Victoria, Tasmania, and South Australia—everywhere he went he put the case to the people for the sugar industry's protection and preservation in Australia as being vital to our White Australia policy, and he ventured to say that, generally speaking, the people in the South realised that it was essential, and they had no prejudice against the industry itself.

Consumers Benefited by Agreement.

He also dealt right through the campaign with the question of the Agreement which expired on 30th June next. He put the facts with regard to that Agreement and he put a large number of facts they had quoted to-day. He had told the people in the South that the Agreement was one which had conferred a very great benefit on the sugar consumer of Australia, and, without hesitation and notwithstanding the great clamour that was going on in some parts, that that Agreement had been to the benefit of the consumer. He wanted them to realise that the Government approached the question with no prejudices because they had spent some of their time in the South. They had fully realised the importance of the industry to Australia—particularly in connection with our White Australia policy.

Reasonable Safeguards for a White-manned Industry.

That was the Government's view. But the Commonwealth Government, he would remind them, was the Government of the Continent of Australia. Mr. Gillies was connected with the Government of the State of Queensland, and he looked at this question with the view of Queensland and of the things which Queensland desired would happen; but, unfortunately, he (the Prime Minister) was afraid the Commonwealth Government would have to look at it not only from the point of view of Queensland, but from that of the whole of Australia, and hold the balance evenly between all the States. He, the day previously, had dealt with the question of sugar, and therefore was not in quite as embarrassing a position as otherwise he might have been, because he could say something to them to-day that was not anything new. He had not at hand exactly what he said yesterday, but he would say it to them again. He had pointed out the value of the industry. Also he believed that the people of Australia as a whole realised that reasonable safeguards had to be given to protect this white-grown industry against black-grown sugar competition. The question was how that safeguard was to be brought about. It was one about which there might be some difference of opinion. He had said that the Government (and he represented the Government) was not prepared to renew the Agreement which expired on the 30th June. He did not intend that afternoon to deal with the reasons for arriving at that decision. It would take some time and he did not consider it was the proper time to do so. He hoped to visit Queensland in the near future, and would then be prepared to deal with the whole question, and, whether they agreed with him or not, they would certainly find he would not shirk the issue. He would then tell them why his Government was doing whatever they may decide to do.

Non-renewal of Agreement.

Without dealing at length with the Agreement, he could put it broadly and say that while the Government realised it had been of considerable benefit to Queensland and the industry—to which eloquent testimony had been borne by Mr. Gillies and Mr. Pritchard—and while during the period it had operated it had been of great benefit to the people of Australia as a whole, the abnormal circumstances which then obtained had now disappeared, and that Agreement as it was in existence under those abnormal circumstances, if it were continued to-day under normal conditions, would be giving to the State of Queensland preferential treatment and better conditions than we are prepared to extend to any other industry. That, of course, was a thing the Government could not possibly do. The members of the deputation might disagree as to the view the Government was taking, and would argue it out on their views; but that was their view and it was why they would not renew the Agreement.

A Tariff Alternative.

As to the indication he had given yesterday on behalf of the Government as to the manner in which they considered the industry should be safeguarded: it was through the medium of the Customs tariff which was in existence in Australia to-day. There were many industries besides theirs in Australia that needed safeguarding against outside competition, but these were always safeguarded by means of the accepted policy of Australia to protection, and was the proper safeguard for the sugar industry. All he could say to-day was that, and he would point out to them that this was the broad outline of what the Government's actions in the future would be. When they had an opportunity to consider the whole question fully, they would define exactly the Government's position and policy; and, further, they would give them this assurance: that they would do it as soon as possible. As soon as it was possible for them to accomplish the necessary work they would deal with the matter, because they could see the position the industry was placed in, in that it was not certain as to the basis of its future operations. He would give them this further assurance: that the Government would tolerate no political finessing. They would make a commencement as soon as they were able to do so.

There was no more that he could say; but, placed as he was, and in view of the fact that the present Government had held office under three weeks, it was unreasonable that they should be asked to say any more at this stage. All that had been said by the deputation would receive full consideration.

The Prime Minister then explained that the reply he sent to the wire asking for the deputation was sent in their interests, because it appeared to him it was a very long way to come when all he could say was that they really must await the Government's policy. He realised, however, why they wanted to come. He did not wish to speak for the whole of his Government, but he believed he had had sufficient to do with this industry and the problems that surrounded it to say that the difficulties were fairly well known to him. At the same time, when he found they still desired to see him, notwithstanding the fact that it was so early in the life of the new Government, he acceded to their request, and could only say he was pleased to see them, to listen to them, and get any assistance he could in arriving at a correct solution of this matter.

TREATMENT FOR FISTULA.

When a fistula on withers is forming, it is customary to apply a blister or hot fomentations. This on rare occasions appears to effect a cure, but in the majority of cases it hastens the swelling and brings it to a head. After it has broken, surgical treatment is required.

The next thing to find out is the direction and depth of the fistula. This is done by using a flexible probe, some 8 or 9 inches in length. Free drainage must now be given by opening along the full length of the probe, or if thought advisable an opening can be made at the lower part of probe, and a seton of tape or other material passed through and tied on the outside. A seton keeps the wound open and assists in draining the cavity, but the first method of opening up is generally found more satisfactory. Both sides of the withers should be opened, if necessary, and any necrosed (dead) tissue removed. The top of withers should not be opened crossways—from side to side—because there is a ligament which runs along the middle line of shoulders from the head—if cut causes serious consequences.

The chief points to remember are—free drainage, the removal of all dead tissue, and the prevention of pockets where pus can accumulate.

The following lotion should be used every third day on the fistula after it has been opened up, until four applications have been applied:—

Corrosive Sublimate	½ oz.
Methylated Spirits	1 pint

This is best applied by soaking some cotton wool or other absorbent material with the lotion, then packing the saturated cotton wool in the fistula. This treatment can be repeated if necessary after ten or fourteen days' interval. Knives, probes, &c., should be thoroughly disinfected before using by placing them in boiling water or some disinfectant such as carbolic acid, Condy's fluid, &c. Knives and other steel instruments should not be allowed to come in contact with the corrosive sublimate solution.—Major A. H. Cory, M.R.C.V.S.

SUGAR: FIELD REPORTS.

The Northern Field Assistant (Mr. E. H. Osborn) reports under date 16th March, 1923, to the Bureau of Sugar Experiment Stations:—

Mourilyan.

After a very successful season's run, this mill is now being overhauled and added to in anticipation of a large crop this coming season. Although the January rainfall had been rather light, the cane in general looked very well.

Some very fine cane was noticed in the area lying between the Cowley line and the North Coast Railway, in most cases being very clean and showing evidence of thorough cultivation. Among individual growers in the Mourilyan area is Mr. Schilling, who is taking a great interest in the newer varieties of cane. He has now planted out some 7 acres of Q. 813 and about 2½ acres of H.Q. 458, and has had a very good strike. If the tonnage and density of these varieties are good upon this particular soil, Mr. Schilling intends planting a larger area. As the mill chemist is always ready to give information on analyses of canes and other matters to growers, the result of this extension will be of much interest to other local farmers. Some very fine crops of beans were seen. Unfortunately, the high price of landing lime makes it too dear an item now. The completion of the North Coast line will, however, soon change this.

South Johnstone.

Weather conditions were ideal for growth. Some particularly fine Badila was noticed upon Mr. M. Darvenera's river flats. One 12-acre block is just twelve months old, and shows 7 or 8 feet of Badila true to type, which would probably now cut over 40 tons per acre. Bar floods or cyclones, a 60-ton crop should be cut here later on. Another 18 acres were cut in July and replanted in September, and will also develop into a good crop on its present appearance.

Further up No. 6 Branch a splendidly even patch of cane is standing upon this red soil country. In this particular locality all classes of cane, from plant to even sixth ratoons, look very green and healthy, and carry a vigorous growth.

Among other red soil areas also showing up well is that known as Miskin's Points, consisting of, say, 300 acres of really good land. Some splendid cane was noticed in the area that lies east from Miskin's towards Stewart's Creek. On No. 7 branch there is an area about the same size carrying fine cane. Upon Mr. J. Velouta's farm is a patch that was cut in September and replanted in October, now carrying good cane. Although this cutting and replanting straight away may appeal to a grower with new and rich ground, it is a practice that will surely result in soil exhaustion.

Nerada Line.

Cane, generally speaking, looks better than it has done for some years. So far, with the exceptioin of a very slightly affected patch near the 12½-mile, the area seems free from grubs. Some very good D. 1135 plant was noticed growing upon an area that was formerly grubby. On No. 1 branch some very good cane was noticed on the alluvial flat country. Most of the country inspected was very clean and free from weeds.

Maria Creek Soldiers' Settlement.

Since my last visit this centre has gone ahead rapidly, and is now quite a compact little township, containing a school with an attendance of about thirty, and two general stores. As one of these stores delivers its goods by means of a motor lorry, it will be easily understood by older visitors to the district how much improved are the roads. There are now eighty settlers, of whom twenty-five are married, and mostly living in the compact little houses built by the department. Most of the cane (all Badila) seen was very fair. About 5,000 tons of cane were railed to the mill last season. Fourteen thousand tons are expected for the coming year. A very large amount of clearing and planting is now being carried out, so 1924 should show a large increase on all the above figures.

Among the farms that looked well were those of Messrs. Applegreen, Borden, Barrett, and McAlonan. These are situated south from El Arish, across Maria Creek, and are upon a reddish, slightly sandy volcanic soil carrying a fair number of small stones. Some good cane was also noticed on Messrs. Pedley's, McIntosh's, and

Carney's farms. This soil is mostly a deep yellowish or chocolate loam, and should last well. All these farms looked well and showed careful cultivation. Unfortunately, there are also a number of others that show that very little work has been carried out since crushing. As the settlers now know how rapid weed growth is in this unstumped and new country, they should certainly strive to keep down all weeds. No country will grow good cane and weeds at the same time. Referring again to the whole South Johnstone area, it can be safely said that it all shows signs of great prosperity. New houses and substantial cane cutters' quarters are to be seen throughout the district, and large areas of land are being got ready for the plough.

A very large number of farmers still avail themselves of the proximity of the Experiment Station, and are now growing small patches of such canes as E.K. 1, E.K. 28, H.Q. 458, Q. 903, 7 R. 428, Q. 813, D. 1135, and others. Most of these canes when seen were carrying a very vigorous growth and promised to develop into heavy crops.

Babinda.

Conditions were very favourable to the good growth of cane. Although backward in growth, the cane is of a very healthy colour, it has stooled out excellently, and carries a splendid top. In most cases the late planted cane and also the later cut ratoons looked better in comparison with earlier planted and earlier cut ratoons. The cold weather experienced about the earlier part of the crushing was responsible for this. Generally the cane is very clean, free from weeds, and shows careful cultivation.

Among the farms visited, Mr. S. H. Warner's property, known as 67, looked very well, some of the ratoons having had a dressing of 6 cwt. of mixed manure applied in two dressings. Prior to planting, another block of young plants was limed with from 4 to 5 tons of crushed limestone to the acre. This all looks very well. Upon Buckland's branch a great deal of work has been carried out. Very large areas are being stumped. Across the Russell River, Messrs. Harwood and Co. have about 100 acres of very fine deep yellowish alluvial planted, and looking splendid.

The Southern Field Assistant, Bureau of Sugar Experiment Stations, Mr. J. C. Murray, reports under date 28th February, 1923, as follows:—

Cooroy and Eumundi.

Since last visiting Cooroy a little extra work has been done in planting cane for the mill, but as yet the farmers are doubtful as to whether the haulage to the rail will not seriously cut down their profits. Much good land is available for sugar-cane growing, and, perhaps, if stable prices prevail, this will in time be connected with tramlines. D. 1135, as a young plant crop, is looking well, but H.Q. 285 and Q. 813 are also good canes for this area. Shahjahanpur No. 10 is also to be recommended.

At Eumundi there is more ploughable country than at the former place, the long valley running west from the township being very suitable for cane on a fairly extensive scale. Mr. Cook, a farmer in this locality, has a very fine showing of sugar-cane, including the varieties H.Q. 285 and Rappoe. Varieties to be recommended are Shahjahanpur No. 10, Q. 813, H.Q. 285, and D. 1135. Rappoe is not recommended, owing to its high susceptibility to "gumming disease."

The district seems fairly free from injurious cane pests or fungoid parasites, although small grub infestations are in evidence.

Nambour.

There is every chance of a heavy crop. On Petrie's Creek and the Maroochy River there has been a considerable influx of new farmers, who are working with energy and enthusiasm, and it is gratifying to note that most of them have first-class crops. The main problem in these localities is drainage, and the following remarks on the benefits of thorough drainage may be of use:—The most important effect of drainage on soil is that it makes it warmer. A wet soil is cold, made so on account of the cooling process of the constant evaporation which always occurs on wet soils. Warmth is very essential for the germination and growth of sugar-cane, and it is the coldness of a poorly drained soil, more than an excessive amount of water, that is responsible for unsatisfactory crops. Drainage allows the air to enter the soil. Air is a very important agency in making the soil productive. Plants must have air

or they will not strike. The soil bacteria that makes fertility cannot flourish without air. Although it may appear strange, draining a soil helps to conserve the moisture when it is most needed. In explanation of this, it might be stated that drainage lowers the main body of water in the soil, thus increasing the volume of soil above it in which the roots of the plant can feed. Plants use only film water, or that which lies round each soil particle, therefore the larger the body of soil above the water-table, the greater the feeding space, and incidentally the greater the available plant food. A soil is more friable after it has been drained than before, therefore it can absorb and hold more film water and its capillary action is also stimulated. So it is that a wet soil is dryer in a wet period, and more moist in a dry period than before it was drained.

Cane pests are not causing a great deal of damage on the Nambour area, although on the Maroochy River a small black beetle is appearing and attacking the cane underground, causing, in some instances, severe losses. Cane varieties that are making a good showing in the Nambour district at present are Q. 813, E.K. 1, E.K. 28, C.S.R. 1, C.S.R. 3, H. 227, H. 277, J. 247, Shahjahanpur No. 10, H.Q. 144, M. 16804, M. 1900 Seedling, M. 189, D. 1135, and H.Q. 285.

Farmers are advised to give these canes careful attention and observe them from a point of view of determining their resistance, susceptibility, or tolerance to disease. Striped leaf disease and gumming are showing in places in D. 1135, but as yet only primary symptoms of the former were in evidence.

A visit was made to the Mount Coolum areas. Great progress has been made here during the last two years, principally in the drainage of the swamp and the extension of the tramway through to the beach. That splendid crops of cane can be grown on the drained areas has now been proved, as about 14 acres planted on what was once a morass, is evidence. A motor tractor did the work prior to planting. Cane varieties that are looking very well in this district are Q. 813, E.K. 1, and H.Q. 285. Excellent fertilising results are being obtained with basic superphosphate on plant cane.

A visit was also made to Mapleton while in the Nambour district. The cane in this scenic area looks well, and a number of varieties obtained by Messrs. Story and Anderson from Bundaberg Sugar Experiment Station are making excellent progress. These canes are Q. 813, E.K. 1, Q. 970, Q. 1098, and Q. 1121. M. 1900 Seedling and H.Q. 285 are also making a very satisfactory showing.

Beenleigh.

Rain is badly needed in the Beenleigh district, although if the cane could get showers soon there would be a fair crop, especially with those growers who have continuously cultivated. During dry spells plenty of cultivation is imperative, as this keeps whatever moisture that is available in the soil. At Pimpama Island Mr. Heck is contemplating considerable extension of tramlines, which should greatly increase the district's output. This gentleman has brought his mill to a high standard of efficiency, a consideration which is always reflected in a farming community by an increased output.

Cane varieties making a satisfactory showing in the Beenleigh district are D. 1135, Q. 813, Badila, B. 208, and Mahona. The farmers are advised to concentrate on growing the two first named, with a small acreage of Badila and B. 208, provided the latter remains healthy. They are advised to discard most of the other canes that are not included in the above list, excepting any which stand out conspicuously, or newly introduced canes undergoing observation.

Marburg.

Very dry weather conditions prevail here, and the cane that is growing has had a serious setback. No large areas are under cane, the farmers being under the disadvantage of not having a local mill. However, the soil in this district is of an excellent quality, and good tonnages of cane could always be grown in ordinary seasons, provided the farmer kept above frost line.

Canes obtained from the Bundaberg Experiment Station include Q. 813, Q. 970, Q. 1098, E.K. 2, E.K. 1, E.K. 28, and Shahjahanpur No. 10. The drought, however, has been severe since these were obtained, and it is improbable that they will make a good showing.

Thanks are due to the different farmers met, for their invaluable kindness and courtesy.

CANE PEST COMBAT AND CONTROL.

The Entomologist of the Bureau of Sugar Experiment Stations located near Cairns (Mr. Edmund Jarvis) has submitted the following report dated 20th March, 1923, to the Director (Mr. H. T. Easterby):—

Field Experiments with Para-dichlorobenzene.

Experimentation with this fumigant was commenced on 17th January, when a plot of Badila (August planting) measuring 264 by 66 feet (one-fifth of an acre) was treated with ¼ oz. injections, placed 7 inches deep, 12 inches apart, and from 4 to 6 inches from stools. The rows on this plot at Greenhills were fumigated on one side only, and when examined about a month later it was seen that the cane had grown vigorously, while the odour of para-dichlorobenzene was quite noticeable in the soil a few inches away from injections.

About one-third of the chemical had evaporated, so we may, I think, conclude that in the case of ¼ oz. doses situated at a depth of 7 inches, ten weeks or longer might elapse before complete evaporation. On 25th January a plot of first ratoons of D. 1135 (measuring 172 by 32 feet) growing on red volcanic land owned by Mr. P. Martinuzzi, at Meringa, was treated on each side of the rows with ¼ oz. injections, 1 foot apart, 6 inches deep, and 4 inches from the canes. Being situated on the brow of a high ridge, this land is usually more or less grub-infested each season, so that we hope to get conclusive results later on. At the time of injecting, these ratoons were about 3 feet high, and the soil was rather dry, while the depth of cultivation varied from 6 to 8 inches. A second plot, separated from the other by a check plot, and consisting of a strip measuring 14 by 472 feet, received similar treatment to the preceding, except that injections were placed 18 instead of 12 inches apart.

When examined about a fortnight later a smell of para-dichlorobenzene was noticeable an inch or so below injections (in the unworked subsoil) and the odour had penetrated upwards to the surface and throughout the soil in a lateral direction between the points of injection. In loose soil it could be smelt 9 or 10 inches away. About one-sixth of the crystals had evaporated. A month after application the cane on both treated and check plots had grown considerably, the leaves just meeting between the rows.

Effect of Fumigation with Para-dichlorobenzene on Sugar Cane.

About a fortnight after injecting close to cane stools it will be noticed that two or three leaves on plants here and there commence to wither from the point downwards. This characteristic browning, which appears mostly on the outer leaves, does not often extend farther than from 12 to 18 inches from the point, the basal portion of the leaf remaining green, and continuing to grow in a normal manner. Many stools, however, remain quite unaffected, although standing in the same row and having received exactly similar treatment.

This leaf-browning is probably due to one or more roots having been bruised or broken by the injector, thus allowing fumes of para-dichlorobenzene to enter the injured portion and affect the normal activities of the cellular tissue.

Fumigation of a plot of first ratoon Badila cane on block K. 4 at Greenhills was commenced on the 16th instant, injections being made on both sides of rows, 4½ inches deep, 12 inches apart, and 2 inches from stools. Grubs at the time of injecting were mostly in the second stage, while the cane was about 3 feet high.

Effect of Poisonous Plants on Cane-grubs.

The possibilities of this form of control have not been altogether overlooked, results of a more or less encouraging nature having occasionally been obtained by us. There is a popular impression to the effect that such plants as sorghum, white mustard, &c., if ploughed into the soil, will poison any grubs chancing to feed on the rotting foliage.

Experiments with both of these plants were carried out by the writer during 1921, when it was found that grubs after devouring young sorghum plants (about

9 inches high) and mustard leaves, were not injuriously affected, but on the contrary, appeared to be plumper and more active, as though such diet agreed with them. Similarly, when fed with the foliage of *Tagetes glandulifera* (Stinking Roger) they manifested increased vitality. In this case, however, our various experiments went to show that cane-grubs have a decided liking for the leaves of this weed, so that the plant might perhaps prove useful as a trap crop. Possibly this liking may furnish an explanation of various reports one hears about the freedom from grub attack noticed in those canefields around Bundaberg where "Stinking Roger" happens to be one of the commonest weeds. Whilst experimenting in 1922 with species of *Jatropha*, *Datura*, *Asclepias*, &c., our most promising results were obtained from plants belonging to genus *Crotalaria*. The possibilities of this genus as a factor in cane-grub control are still under investigation here, and may yield interesting data in the near future. In this connection, I should like to acknowledge assistance received from Mr. F. B. Coleman, of the Department of Agriculture, Brisbane, who has been good enough to forward me seeds of various poisonous plants for experimental purposes.

Carbon Bisulphide for Cane-grubs.

Canegrowers would do well to bear in mind that eggs deposited by the first brood of grey-back beetles (which started to emerge on 22nd December) were hatched about 10th January, producing grubs which at the present time are mostly in the second stage, while eggs laid by the brood of beetles which appeared later, about the middle of January, are nearing the end of the first instar. During the next few weeks fumigation of the soil with carbon bisulphide should be carried out on areas presumed to be grub-infested, the ground at present (26th February) still continuing in good condition for such treatment. Operations in this connection were commenced this season at Greenhills on 14th January, at a time when grubs were mostly in the first stage, or had just moulted into the second. The soil at that time was fairly dry, although moist enough to retard upward evaporation of the fumigant. On some of the blocks treated, many of the stools examined appeared to be free from grubs, or but slightly affected, while others gave decided evidence of infestation. Grubs for the most part were feeding among the surface roots, at depths varying from 3 to 5 inches, and although the ground was examined to a depth of 2 feet or more, none were found below 9 inches. No time should be lost while the cane continues small enough to get among, and grubs can be destroyed before large enough to work appreciable damage. In the event of heavy rain occurring, fumigation should, however, be discontinued for a few days, until excessive moisture has drained away, and left the soil sufficiently open for the fumes of bisulphide to freely penetrate in all directions. When examining a block thought likely to be grub-affected, several stools in various parts of the field should be dug around, in order to gain an approximate idea of the percentage of grubs per stool, of their size, and the depth at which they are lying.

The fumigant should then be injected an inch or two above them, care being taken to close the holes made, by pressing the surface-soil with the foot after each injection. When treating very young plant-cane injection on one side of the rows is sufficient, while for ratoon or early plant-cane it is often advisable to treat both sides.

Tachinid Fly Parasite of Cane Borer.

Our rearing of these parasites has been discontinued of late owing to difficulty in procuring borer-infested canes from which to obtain grubs for our cages. These flies do not appear to breed as readily in sticks of D. 1135 as in Badila, owing perhaps to canes of the former variety being thinner, less juicy, and containing a larger percentage of fibre. Canes of Badila retain their moisture for a longer period when placed in breeding cages than is the case with D. 1135, which, if transferred during hot weather, does not always root in time to prevent shrinkage of the rind. Occurrence of the cane borer last season at Freshwater near Cairns has been brought under our notice recently by the manager of Hambledon Mill, and we hope in the near future to liberate tachinid flies at various infested centres in that district.

Other applications for parasites have been received from Mirriwinni, Mount Sophia, and elsewhere.

THE COMMON FRUIT FLY *(CHAETODACUS TRYONI).*

SOME ELEMENTARY FACTS.

In response to a request of the Tingoora Local Producers' Association, Mr. Henry Tryon, Government Entomologist, supplies the following elementary facts:—

1. The fruit fly, otherwise known as the fruit maggot fly, is a small two-winged insect with a body that, measuring about 3-10th inch in length, is pale reddish brown in varied tints, and conspicuously marked with a few yellow spots. The female fly, usually rather longer than its consort, has a top-shaped pointed hind-body, whilst that of the latter is semi-oval in outline.

2. This insect attacks almost every kind of cultivated fruit raised in Queensland. Also, some of those of our forests and scrubs, for it is an Australian native. Not all, however, are equally injured by it.

3. The fruit fly manifests four different phases of growth:—(*a*) the fly, (*b*) the egg, (*c*) the maggot, and (*d*) the pupa or chrysalis.

4. Its injurious connection with the fruit commences with the deposition of the egg therein, and thereupon until the next phase of life is completed, and it is then a full-grown maggot; it lives within it, being increasingly injurious as it attains this degree of development.

5. The egg, in establishing this connection, is placed by the female fly by aid of its penetrant ovipositor beneath the skin of the fruit assailed, either singly or in batches of several—eight or more; whilst, again, more than a single fly may thus place its eggs in any single fruit. The variation in the number of eggs that any fruit receives, and that may range from one to fifty or more, depends on its size and on its consistency at the time, amongst other features; whilst, again, there are characteristics in certain fruits that influence the measure in which further stages in the insects life may be realised, and whether even it may develop into a destructive maggot at all or may not.

6. Of the two successive life phases of the insect—that of the egg and that of the maggot—directly associated with the fruit, the length of the duration of each is dependent on varying factors, and therefore not always the same; the temperature influencing that of the egg, and this, and the food supply immediately available, that of the latter.

7. The egg phase usually lasts about three days, whilst the maggot may become full-fed in ten days.

8. When full-fed the maggot leaves the fruit ordinarily on this fruit falling to the ground, as it usually does as the result of maggots infestation, but sometimes, when the fruit remains notwithstanding attached, it still issues from it.

9. If free to do so, it thus enters a short distance into the soil; if not, it remains otherwise concealed.

10. On having done so it changes to the chrysalis or pupa, this life phase being attained within twenty-four hours or less. This ordinarily happens, but when the soil is very dry it apparently cannot so transform.

11. After an additional ten days (sometimes seven may suffice for this), the pupa has given rise to the fly again, and this, unless prevented, has found its way to the surface and into the free air.

12. The fly feeds upon sweet substances of many origins, including the nectar yielded by certain flowers.

Conclusions.

(*a*) These facts, pertaining to the common fruit fly of the State, will explain its rapid increase with the progress of the seasons.

(*b*) Again, the existence of fruit being necessary for the fly's existence, and its actually for a time in its life becoming voluntarily imprisoned therein, will suggest not only a means of control arising from this circumstance, but how it can become disseminated through man's agency. Nature, it is true, places limits in its numbers. Its active life and developments are, in fact, then, determined by the lower winter temperatures of the southern and of the more elevated northern parts of the State, and again it has its parasitic and predatory foes. But notwithstanding the fruit-growing industry, whilst it provides the opportunity for its increase, also provides that for exercising measures for its subjugation.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF FEBRUARY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING FEBRUARY, 1923 AND 1922 FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Feb.	No. of Years' Records.	Feb., 1923.	Feb., 1922.		Feb.	No. of Years' Records.	Feb., 1923.	Feb., 1922.
North Coast.	In.		In.	In.	*South Coast*—continued:	In.		In.	In.
Atherton	9·05	21	3·94	23·72					
Cairns	15·01	40	11·22	22·03	Nambour	8·34	26	5·91	21·26
Cardwell	16·60	50	5·32	41·29	Nanango	4·26	40	1·93	2·66
Cooktown	13·42	46	8·82	7·52	Rockhampton ...	7·40	35	0·42	11·73
Herberton	7·23	35	3·60	16·34	Woodford	8·67	35	2·88	11·51
Ingham	15·26	30	4·32	35·78					
Innisfail	21·51	41	14·51	44·09					
Mossman	15·01	14	8·78	23·54					
Townsville	11·61	51	0·27	13·31	*Darling Downs.*				
					Dalby	2·87	52	0·32	2·28
Central Coast.					Emu Vale	2·26	26	0·00	1·33
					Jimbour	2·83	34	0·03	2·23
Ayr	8·82	35	0·12	9·18	Miles	2·64	37	0·07	2·53
Bowen	8·55	51	0·93	12·94	Stanthorpe ...	3·31	49	0·20	1·41
Charters Towers ...	4·37	40	0·37	5·24	Toowoomba ...	4·31	50	0·07	4·63
Mackay	11·54	51	1·38	11·11	Warwick	3·12	57	1·10	1·77
Proserpine	10·58	19	1·56	19·53					
St. Lawrence ...	7·93	51	2·29	12·50	*Maranoa.*				
					Roma	3·07	48	1·35	1·68
South Coast.									
Biggenden	3·59	23	0·41	2·90					
Bundaberg	6·01	39	0·48	9·60	*State Farms, &c.*				
Brisbane	6·27	72	0·69	7·55					
Childers	5·77	27	0·61	8·17	Bungeworgorai ...	2·69	8	1·21	0·64
Crohamhurst ...	13·85	30	3·47	19·68	Gatton College ...	2·84	23	...	3·13
Esk	5·37	35	0·15	6·19	Gindie	2·68	23	...	8·96
Gayndah	4·09	51	0·12	1·85	Hermitage ...	2·35	16	...	1·71
Gympie	6·50	52	1·48	12·00	Kairi	6·70	8	...	26·49
Glasshouse Mts. ...	7·96	14	4·32	16·69	Sugar Experiment Station, Mackay	10·23	25	2·09	10·78
Kilkivan	4·94	43	1·45	4·92	Warren	3·93	8	...	7·32
Maryborough ...	6·40	51	5·18	7·25					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for February, 1923, and for the same period of 1922, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND,
State Meteorologist.

BOT FLY.

To prevent the flies from finding a suitable lodgment for their eggs, the long hairs should be clipped off or singed from the nose, lips, jaws, shoulders, and legs of all horses. Regular daily grooming should be carried out to detach any fly eggs, before they have time to hatch, and the parts from which the long hairs have been removed should be smeared daily with a mixture of linseed oil 20 parts, turpentine or kerosene 1 part. All manure containing bots or grubs should be destroyed by burning.

After a horse is affected—viz., when the bot fly grubs are in the stomach—medicines are of little service in removing them until the summer months, when they are being naturally expelled. It is then advisable to drench with one of the following drenches:—

(1) Turpentine, 2 oz., mixed in 1 pint of milk; or

(2) Carbolic acid 2 drachms, glycerine 2 oz., water 4 oz., milk 1 pint.

Either of these drenches should be followed in a few hours by giving 5 drachms of aloes, as a ball, or 1 pint of raw linseed oil.—Major Cory, M.R.C.V.S.

WEEDS OF QUEENSLAND.

By C. T. WHITE, Government Botanist.

No. 31.

THE RUBBER VINE (*Cryptostegia grandiflora*).

The Rubber Vine (*Cryptostegia grandiflora*) has for some years past been a naturalised weed in parts of Northern and Central Queensland. Of late years it has become a considerable pest along some of the Gulf rivers, and at the urgent request of the Etheridge Shire Council the plant has been declared a noxious weed throughout the State. There is, practically speaking, little or no possibility, however, of the plant becoming a pest in the southern parts of Queensland.

Description.—A rampant climber, often of shrubby growth when growing in the open, the stem, leaves, and seed vessels exuding a milky sap when cut or broken. Leaves glabrous, elliptic, 2½—4 in. long, 1¼—2 in. wide. Flowers large, borne in terminal cymes; corolla from almost white to lilac purple about 2 in. across. Seed vessels (follicles) 4—6 in. long; seeds very numerous, each with a tuft of long, white, silky hairs at the apex.

Distribution.—Native country probably Madagascar; common cultivated or naturalised in most tropical countries.

Botanical Name.—*Cryptostegia*, from the Greek *kryptos*, hidden, and *stega*, a covering from the essential parts of the flower being concealed in the throat and not exposed as in neighbouring genera.

Properties.—The plant yields rubber of commercial quality. Samples of the rubber collected from plants growing at Charters Towers and submitted to the Dunlop Rubber Company by this Department in 1910 were reported on as being worth 3s. to 3s. 2d. per lb. (then rather a low figure). The following interesting report on this rubber was made at the same time by Mr. Howard Newport, Instructor in Tropical Agriculture, at Cairns:—

"*Cryptostegia grandiflora* has been recorded for many years as producing rubber of fair quality in India, Madagascar, and elsewhere. The rubber is commercially known as 'Palay.' The plant has been experimented with, I believe, in the Calcutta, Peradeniya, and other agricultural and botanical institutions, but has not been received by planters with favour.

"Palay rubber belongs to a group of rubbers collected from the stems of vines or creepers, generally by a process of cutting up the whole of the aboveground growth (and sometimes the root also) for subsequent extraction of the latex by natural exudation from the cut surface, by crushing or grinding, or by boiling, &c. In either case the vine is destroyed and has frequently to be left for considerable periods (sometimes ten years) before sufficient new growth has taken place to make another collection worth while. Hence vine rubbers, though of good quality and valuable where found growing wild in scrub or forest areas, have not met with a favourable reception as plants for cultivation in plantations, comparing unfavourably with trees such as Para, Ceara, Castilloa, Assam, &c., which can be tapped continuously for many years.

"It may be noted that the price quoted for the samples obtained from Charters Towers—viz., 3s. to 3s. 2d.—scarcely indicates a high quality in view of the fact that fine hard para rubber at the time was 9s. 6d. per lb., and the very worst and dirtiest 'negro head' wild rubber 2s. 6d. to 2s. 9d. per lb., and hence it is doubtful whether it would pay to collect this with white (even child) labour at the price, but considerable improvement may be possible."

Poisonous properties.—The "Rubber Vine" belongs to a family—the Asclepiadaceæ—containing a number of plants possessing poisonous properties. I have heard of no cases of stock poisoning from the plant, but animals rarely if ever touch it.

Eradication.—Where possible the plants should be grubbed out and burnt. Where growing very thickly spraying with an arsenical weed-killer might prove effective. The Agricultural Chemist has recommended the following as a suitable spray for weeds. "Half a pound of arsenic, dissolved by means of ¼ lb. of caustic soda, in 3 gallons of water, and this solution then diluted to 10 gallons with water."

Botanical Reference.—*Cryptostegia grandiflora* R. Brown, in Botanical Register t. 435 (1819).

Plate 57.—Rubber Vine (*Cryptostegia grandiflora*).

A.—Flowering shoot. B.—Seed pod (follicle). C.—Seed.

SOME NOTES ON SILAGE WITH SPECIAL REFERENCE TO STACKS.

By H. C. QUODLING, Director of Agriculture.

Silage stacks suffer deterioration if an attempt is made to hold them over from season to season. Best results are obtained by building them at the latter end of Summer, in the flush season, and using the fodder in the Winter or Early Spring.

It is evident that the dairymen and sheep farmers of our agricultural districts will never come into their own until their stock can be satisfactorily carried through the winters and over any dry spells which may occur.

Increased land values, and a general all-round rise in the cost of living and, similarly, in that of production, may be cited as reasons for keeping stock in condition and in a state of efficient productivity consistent with ruling conditions.

Cultivated crops and artificial pastures are doing much in effect, but seasonable shortcomings can only be met by looking to the contents of the barn for dry feed, and to the silo or stack; in this latter instance is to be found a palatable, ready-to-hand form of succulent fodder, which should be provided on every farm where live stock are kept for profit. Many arguments may be advanced in favour of silage, but it is felt these are not required where practical thinking men are concerned, whose chief inquiry is for reasons to prove to their intelligence that, by adopting certain methods of conserving fodder, they are to get a *quid pro quo* for their outlay, be it in labour or in kind.

Queensland's rich soils and generous summer rainfall are responsible for crop growths not attainable in the more temperate parts of the Commonwealth; and when such tangible results are to be so easily secured from Nature's garden, it is certain that a stockowner's desiderata in the matter of a supply of the right class of fodder will be readily attained by an extension of the self-help methods common to all who have to wrest a living from the land.

Inquiries through the medium of the Department on silo construction and its attendant features are sufficiently numerous to indicate that interest has been aroused in the subject of fodder conservation.

It is not proposed here to dilate on the merits of different silos or advocate possibly out-of-reach methods likely to act as a deterrent on account of an initial outlay of capital but rather to deal only with a section of the subject with simple and economic features designed to meet local and existing conditions.

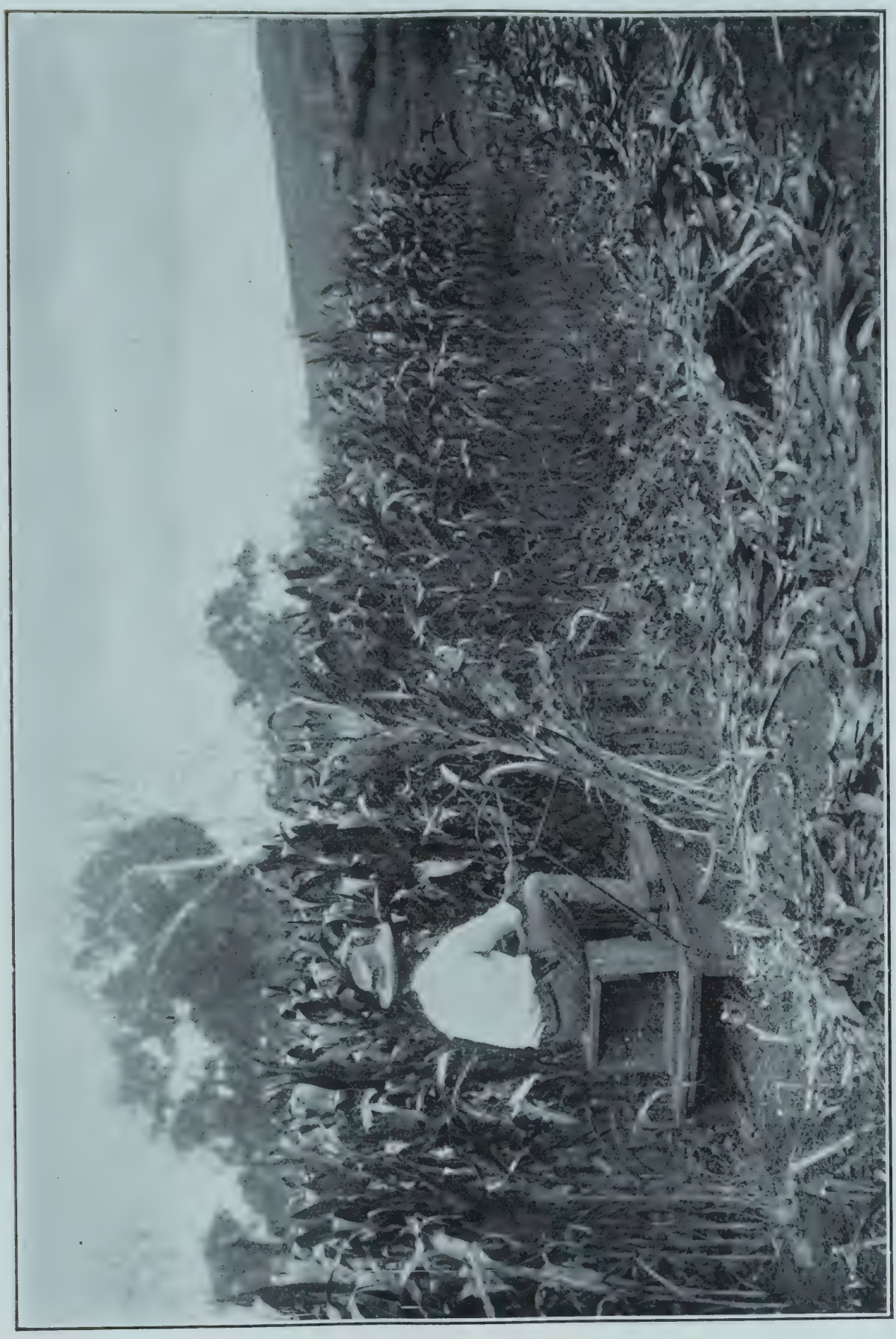


Plate 58.—Sledge cutter at work in an immature crop, showing manner in which stalks are laid down by means of guide rod.

A number of silage demonstrations have been carried out by Departmental officers, and, although evidence in a general sense is not wanting to show the possibilities of fodder conservation, it is more fitting that the words of those farmers who have followed out the methods advocated may be made known to others who contemplate erecting silos or stacks.

Extracts from their manuscripts are as follows:—

"The stacking of maize was finished on Saturday, 3rd May. All are well pleased with the way the lever worked. It was rigged up so that the bundles were slung right over the side into the middle of the stack, and the earth for weighting (6 tons) was put up in the same way. We started feeding the silage to the cows straight away, and they took to it greedily, and are showing an increase already, so we are reaping the benefit of stored fodder."

"The ensilage is very good, and the cows would tear the stack of maize down to get at it."

"I think the method of stacking all that can be desired—that is, when one cannot afford to build a silo. It opens up splendidly, in my opinion, with very little waste, and stock eat it readily, notwithstanding that we had to cut the crop (maize and sorghum) on the green side, on account of being afraid of frost. The cows chase the dray as soon as they see it, and milk well on the fodder."

"It has been the means of storing from 100 to 160 tons of silage (sorghum and maize) which might otherwise have been spoilt."

"In 7 weeks after stacking, I commenced to use the silage, and came to the conclusion, in a very short time, that I had a valuable asset from a feeding point of view. I fed in boxes at the rate of 40 lb. per diem per cow, and cows which had been in milk from 4 to 8 months increased their flow fully 50 per cent. Cows which have newly freshened keep up their normal first flow unceasingly, and that during winter. It is better to feed after milking than before, and I am at present obtaining an A1 grade from the factory for my cream. . . . am well satisfied with the experiment, and have come down to the bed-rock conclusion that, as soon as funds will permit, I will erect a silo, as, after some years' experience, it has been found that one cannot 'dairy' in the winter on artificial grasses with profit, and ensilage appears to be a *par excellence* winter ration. The sorghum ensilage is chaffed with a small percentage of sugar-cane, in order to carry it through the chaffcutter, as it is not the best stuff to chaff by itself."

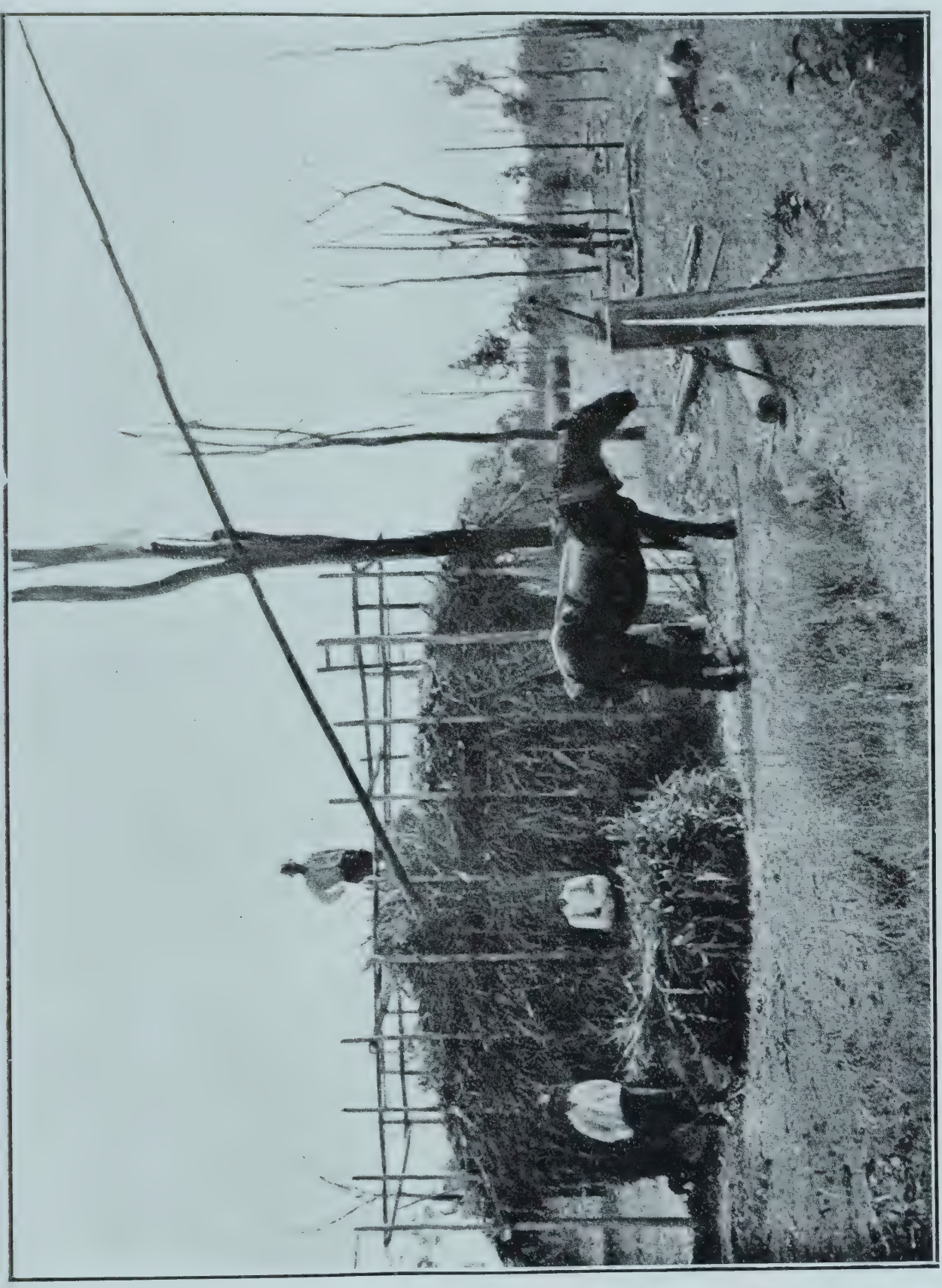


Plate 59.—Stack in course of construction, showing projecting "untrimmed" ends, also "whip" hoist attached by means of a chain to a dead tree.

"Maize and sorghum were sown in alternate rows. Owing to dry weather, there was only a light crop; a reaper and binder was used to cut the crop, and the carting was done with rough sledges, each drawn by one horse; stacking began on 26th March, and the stack was opened in the second week in July. After cutting down the first bench of about 9 in. as waste, it was found to be in good condition. The cows did not take to it at first, but the calves ate it well. One by one, however, the cows began to eat it, and now nearly all of them are feeding on it, some of them taking it greedily."

"We are milking 22 cows, and it is a significant fact that a pronounced increase in the milk yield has followed. As they have no other change of food, I can only attribute this increase to the silage. As the feed* in our paddocks is now becoming poor, and there is little prospect of its improving for a month or so, I view the silo, with its stock of compressed fodder, with great satisfaction, as I believe it will tide our dairy herd over the critical period of the year. This is its great value, and I more than ever see the wisdom of having laid by this winter store of food. During the coming summer I shall build a much larger stack on the same pattern, and hope to put by 70 or 80 tons of maize and sorghum for the winter. I assure you of my complete satisfaction at the result of your experiment on my farm."

"Am very well satisfied with the experiment and will build a considerably larger stack next year, all being well. I am not using up to the full amount, but what I am is keeping my cream and milk supply up to its regular amount; other hay, such as lucerne, oaten, and, at times, bush hay is mixed with it. My cows, when it was first offered to them, did not seem to care about eating it, but now they have got used to it, they nearly go mad to get at their feed."

"I opened one end of the stack to see what it was like, and am glad to say it is first class. I am perfectly satisfied with the experiment, and intend going in more for it in the future. When stacking was finished I put in 18 inches of earth on top, sloping from centre of stack to the ends; then five wires across the top and hung very heavy logs to them; two persons who have examined the stack, and know stack ensilage in other parts, state that it is in excellent condition."

Instances are not uncommon where maize crops have made good growth up to a certain stage and then failed to set grain through the

* Principally Rhodes grass.

Plate 60.—Stack silage demonstration at dairy inspectors' special silage instructional course, Queensland Agricultural College, Gatton, 1919.

dry weather. In the Southern Burnett part of the 1916 crop was affected in this way. Altogether about 50 stacks were erected in this locality alone, some ranging to 150 tons capacity.

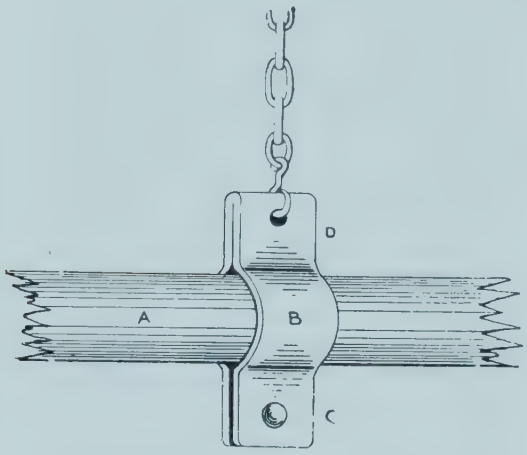
Again in 1919 officers of this Department held demonstrations in silage making, and travelled through several districts with the object of assisting and advising farmers who were determined to turn their wilted crops to good account for fodder purposes, upwards of 12,000 tons of fodder being conserved, which assisted in saving the lives of many valuable dairy stock.

Inquiries made since show that the silage was found to be of great value and of satisfactory quality.

POINTS TO BE OBSERVED.

Maize is one of the best and most satisfactory crops to grow, but any ordinary crop which is commonly used for green fodder or hay will make good silage.

The amount of labour involved in the handling of bulky green fodders may be considerably reduced when machinery is available for cutting and for binding into sheaves.



CLAMP FOR SUSPENDING WHIP.
(*a*) Whip spar.
(*b*) Clamp made from an old tyre 4" × $\frac{5}{8}$".
(*c*) Clamping bolt.
(*d*) Clamp welded and bored for hook.

Where large quantities of fodder are to be handled, a mechanical hoist is required for the higher levels of the stack. For hand work the "whip" type is preferable. In connection with the erection of a "whip" it is necessary that some means be adopted to prevent the spar slipping at the point of suspension, and the clamp shown in the sketch is an effective and useful means of preventing this. A substitute which is also very effective may be obtained by using an ordinary chain strong enough for the purpose and forming a "clove" hitch at the point of suspension, afterwards nailing on two small hardwood blocks to the "whip" spar, one above and one below the position of the chain on the spar; or drive in two strong iron staples. For horse power a yardarm and spar, with suitable blocks and the necessary wire rope and clutching dogs, make an effective combination, or pulleys and tackling may be substituted.

Fodder stacked in the open is subjected to an atmospheric pressure of 15 lb. to the square inch; and the stacker's chief concern should be to check combustion as much as possible—*i.e.*, by preventing the access of air to the mass.

Waste is unavoidable at ends and sides and is to be expected. A 25 per cent. depreciation will take place under indifferent conditions of stacking. The loss under good conditions should not be more than 12 per cent., provided attention is given to salient features and to working detail.

Coarse or fairly mature fodders require a greater dead weight pressure, and do not compact as readily as finer and more succulent plants.

Emphasis is placed on the fact that the success of a silage stack depends very largely on the consolidation of the contained fodder so as to exclude air, which, if admitted, would cause rapid deterioration.

"Use plenty of weight when stack is completed."

Variations in temperature are factors in the chemical and biological changes which take place in the process of turning a mass of green fodder into silage, but it is unnecessary to go to any more trouble than to check the processes of oxidation and fermentation which are responsible for high and abnormal temperatures. When undue heating takes place during the process of stacking, the temperature of the mass is readily reduced by putting on more green fodder, and by throwing a series of wires across the stack and hanging heavy logs to them; this may be done at the close of each day's operations. Where a limited number of animals are kept, long and narrow stacks are preferable, as the lesser superficial surface is exposed at the ends when feeding out. The higher the stack, in keeping with facilities for hoisting, the better.

It takes from 50 to 56 cubic feet of consolidated silage to make a ton. Crop yields may be computed and the dimensions of frame work arrived at. Abnormal settlement is to be expected, and weighted stacks usually settle down finally to a little less than two-thirds of their original height.

Heavy crops like maize and sorghums should be evenly sown in regularly spaced drills to facilitate harvesting by machines; the production of a medium thickness of stalk with a maximum of leaf should be aimed at.

Immature crops produce a less palatable and inferior article from a feeding standpoint. Where maize is to be chaffed into a silo, the crop may be left standing until the plants acquire the most nutriment—*i.e.*, when the grain attains the soft dough stage.

For stacking, it is an advantage to cut when the grain is in the "milk" stage before the stalks become too firm. Sorghum, Japanese millet, panicum, &c., should be cut when the seed heads or panicles are well formed and the grain about half developed.

The Stack.—The site should be chosen on a naturally drained piece of ground, and handy for feeding out to the stock, and yet as close to the crop as it is possible to get it.

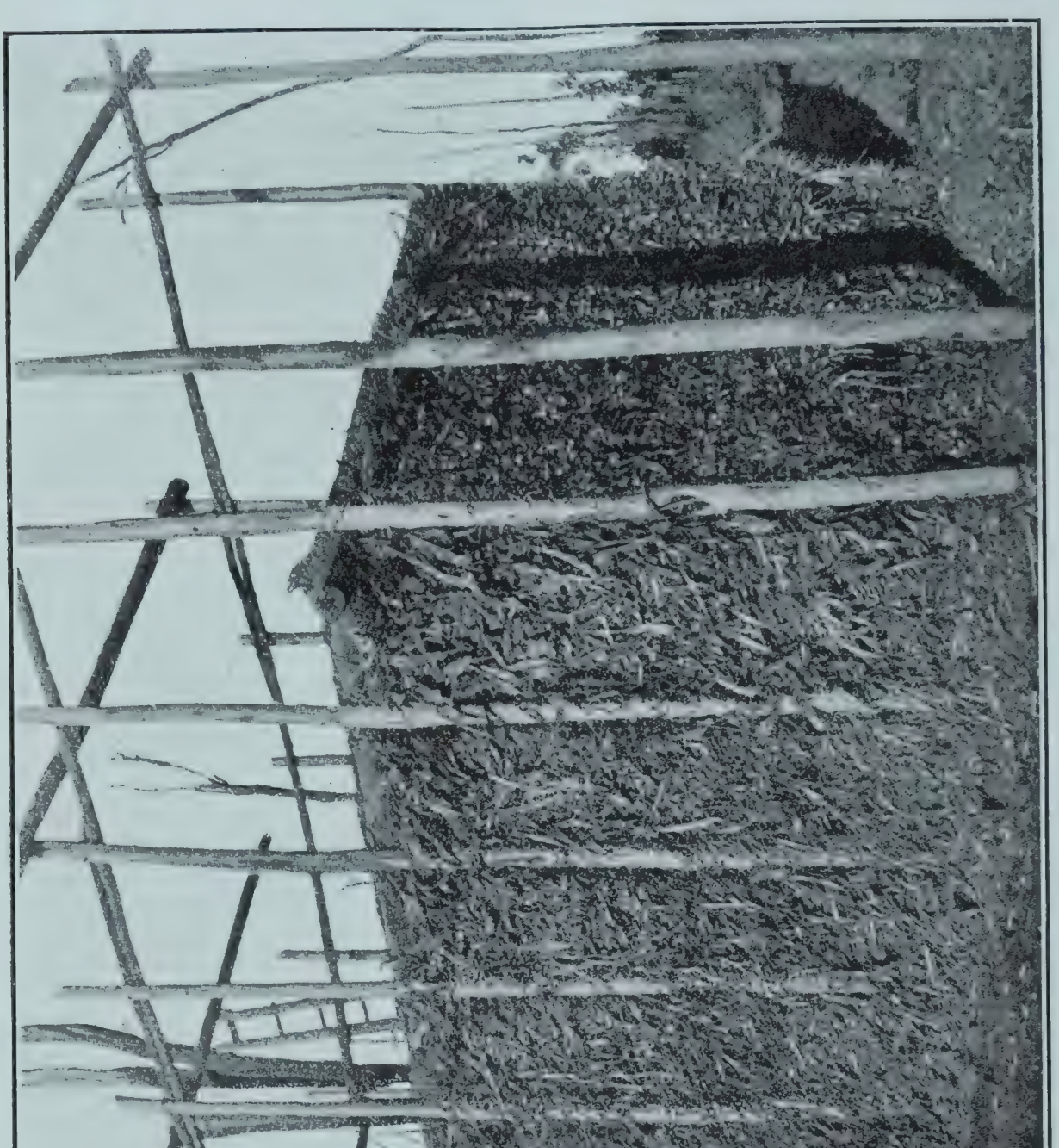


Plate 61.—Framework and "trimmed" stack, showing an extra pair of uprights at each end to which a crosspiece is attached.

When computing prospective contents of stacks several factors require to be taken into consideration, amongst which are—

Material used for silage;

Condition of crop at time of cutting;

And the amount of dead weight to be subsequently added to consolidate the stack.

Sorghums and millets are inclined to pack tightly and afford, on this account, a heavier average weight to the cubic foot than maize.

The following table of contents of various sized stacks may be taken as approximate: sorghums and millets, as previously mentioned, will weigh somewhat heavier:—

SIZE OF PERMANENT STACK AFTER ENDS ARE TRIMMED.

Feet.		Tons.
12 × 9 × 15	=	42·6
12 × 10 × 15	=	47·3
15 × 9 × 15	=	53·3
15 × 11 × 15	=	65·1
18 × 10 × 15	=	71·0
18 × 12 × 15	=	85·2
21 × 12 × 15	=	99·4
21 × 14 × 15	=	116·0

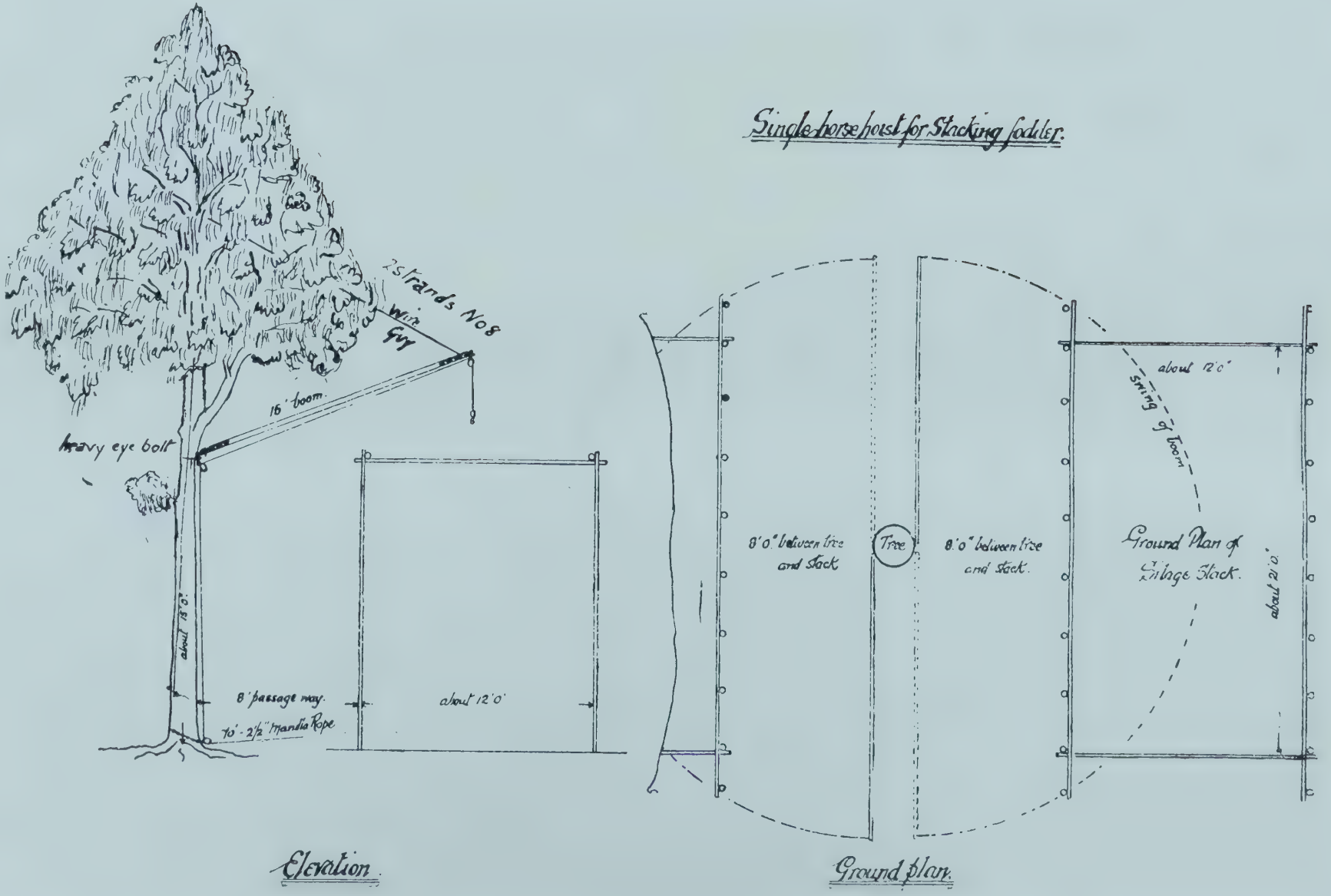
In setting out a frame for a stack 18 ft. by 10 ft., ten poles on each side would be required, arranged as follows:—

Poles require to be 17 ft. 6 in. in length, and about 5 or 6 in. in diameter at butts. Sink the holes 20 to 24 in. in the ground. Top plates and tie beams should be securely twitched on close to the top of uprights, to make the framework rigid.

When long-stalked crops are to be stacked, a fair average distance apart to place the uprights is 3 ft.; for shorter-growing crops this distance should be lessened accordingly.

Construct a framework of bush poles similar in design to those in accompanying illustrations, the dimensions of which and distances between the uprights being arranged so as to accommodate the amount and class of fodder on hand. Plant the poles firmly in the ground; attach the top plates with a wire twitch at a height of, say, 15 ft. from the ground. Brace across at ends and at centre, taking care that the pair of poles intended for carrying the central brace or tie are carried up high enough to give head room for the stacker when moving about on the upper levels of the stack.

Single-horse hoist for Stacking fodder.



Elevation.

Ground plan.

The uprights may be spaced at a distance apart of 3 ft. along the sides for maize and sorghums, and a minimum of 2 ft. for crops like barley and panicum. An extra pair of uprights should be put in at each end of the framework and braced securely; a crosspiece is attached to these to carry the projecting ends of the fodder until such time as they are trimmed off, the crosspiece subsequently being moved higher up to serve a similar purpose.

The position of that portion of the top plate, proving to be in the way for the "travel" of the whip, may require to be altered temporarily, or brought down to a lower level, and afterwards raised as stacking progresses.

The framework is of no value once the stack has settled down.

The "corn binder" is the most approved machine for cutting and binding maize and similar strong-growing crops into sheaves.

Plate 62.—Sledge cutter 5 feet 6 inches long by 2 feet 4 inches wide, showing projecting scythe blade (passed through mortice), also angle to set guide rod.

Lighter classes of crops may be handled to advantage with an ordinary "reaper and binder" or back-delivery "reaper."

The secret of handling heavy crops is to keep the stalks parallel in the bundles, whether cut by machine or by hand.

Maize and sorghums, if standing fairly upright in the drills, may be cut with a sledge cutter, which is simply a narrow sledge, set on a pair of runners and decked with 6 in. by 1 in. boards—a scythe blade

is attached at one side at an angle adapted for slicing off the stalks, and should be braced in such a way as not to interfere with the cutting. Fix a guide rod to lay the plants down evenly in a regular swarth. They can then be kept fairly parallel when gathering them into bundles. For hand work an ordinary cane knife is very suitable.

Sledges are the handiest for short hauling distances; when the "hoist" is used, the fodder should be loaded on to suitably sized rope slings to be ready for lifting off.

Before commencing to stack, open out a shallow drain around the outside of framework, and use the soil for levelling off any surface inequalities within it. Place a layer of about 6 in. of waste green grass on the ground. Start stacking on this and KEEP ALL THE STALKS LAID THE ONE WAY. Transverse layers admit air far too much into the stack. Place the tassel end of the maize at least 3 ft. 6 in. over at both ends of the stack. When placing down the next layer, reverse the order, and if the fodder is at all on the dry side, damp it with water, and take the precaution also of placing some of the leafy portions of the fodder over any bare patches which may be present. When a height of about 3 ft. has been reached, lay down a board flush with a pair of uprights which are to form the true ends of the stack, and trim off the projecting ends of the fodder. Before starting to stack again, move the crosspieces up the outside pair of uprights, in order to support the ends of the second tier of fodder. Repeat the process of stacking and trimming off as previously noted.

A minimum thickness of not less than 2 ft. 6 in. of fodder should be stacked each day.

Keep a good camber in the centre of the stack, as heating soon causes abnormal settling there. Use judgment when binding the layers back, so as not to have any bumpy joints where the laps come. Care should be exercised in placing fairly straight stalks along the sides, and these should be well firmed down between each pair of poles, the laps being carefully watched to prevent any spaces being left.

The trimming of the ends, which should be done with a plain hay knife, ensures a consolidated section exposed to atmospheric influences, but the carefully concealed over-lapping of the stalks at the sides is essential for keeping the air from penetrating the mass; the more the air is kept out, the smaller the percentage of loss.

Settling takes place rapidly as soon as the mass begins to heat.

As previously noted, wires, heavily weighted, should be thrown over the stack at night time, attention being paid to the placing of separate wires within a few inches of each end of the stack where it is trimmed off. Remove wires and weights before continuing to stack next morning. Allow a big margin for settling. When finished to a full camber, spread

PLATE 63.—Stack built on Mr. T. Chay's farm at Wetheron under the supervision of the Department of Agriculture and Stock.

a layer of several inches of soft green grass or other close-textured weeds immediately on top of the silage; water this well. A framework of logs should then be placed evenly on top of the completed stack; these should be halved at the ends in a similar manner to the ground plates of an ordinary building. The weighting material is evenly disposed over the whole surface of the stack, the logs keeping the loose soil, or any other kind of material used to supply the weight, in its place. The layer of soil must average about 12 in. in thickness. The stack should then be topped off with bush hay or other waterproof material. A neat finish should be given to the roof, which requires to be built to a full eave, and all loose straws raked off. Wires are then placed across the top, and well weighted in order to keep them in position.

OTHER WEIGHTING MATERIAL.

Stones, where they are easily procurable, may be substituted for soil, and the spaces between the stones can then be filled, if so desired, by soil.

Permanent weighting material is readily prepared by filling kerosene or benzine tins with concrete or with cement and sand compo., twisted wire handles being inserted in the mixture before setting takes place. This latter system economises labour where silage-making becomes a regular institution on the farm.

Although it is an advantage to allow the stack several weeks in which to settle down, and afford the necessary time which is required to effect the metamorphosis "from green fodder to silage," it may be opened at once, should the fodder be then required. All that is necessary is to throw off some soil at the extreme end of the stack and cut down a narrow bench from top to bottom. The covering of soil on top keeps the rest safe from the weather.

Stacks are not meant to last more than a few months on account of depreciation from exposure to the weather, but instances have occurred where they have been kept for years, and then used to advantage. (Silage will keep, however, for many years in a well-built silo, and the depreciation is infinitesimal.)

Better results are obtained by chaffing the silage before use, and its passage through the chaffcutter is facilitated by using any strong-stalked fodder to assist in carrying it through.

A handy method to provide for feeding out to animals is to make receptacles, to act as makeshift troughing, out of ordinary 4-bushel sacks strung on No. 8 wires. Pairs of round uprights are put in at opposite ends of a line of fencing, the character, length, and gauge of which are designed to carry the sacks strung out on or sewn at each side to No. 8 fencing wires, running parallel to one another and placed at

Plate 64.—Stack in course of construction at Bowenville, Darling Downs. Weighting material (stones) being hoisted by a horse prior to the topping off of stack with bush hay.

such a width apart as to form the suspended sacks into receptacle of the desired depth. Crosspieces may be nailed to a series of pairs of intermediate posts, and the holes for the wires bored through these to suit. The same class of feeding receptacles may be used for sheep, but should be made narrower and kept at a convenient height from the ground for feeding.

BRIEF NOTES ON SILAGE AS FOOD.

"Silage is not a perfect food, and must be supplemented by other fodders and concentrates where full milk production is looked for."

Plants like maize, sorghum, and similar fodders, which contain a relatively high proportion of carbohydrates (starch, sugars, &c.) used in an animal's system for maintaining bodily heat, do not form perfect foods until more protein or flesh-forming substances are added in proportion, recognised as suitable in the aggregate, for making up a balanced ration. Leguminous plants—lucerne, cowpeas, field peas, &c.—are designed by Nature to supply this deficiency. In practice, it is found that the succulence of silage assists in the assimilation by animals of dry foods and cured fodders.

A good combination of food for one day, sufficient for the support of one cow of 1,000 lb. weight, when yielding up to 3 gallons of milk, is arrived at by feeding 45 lb. of maize silage and 15 lb. of lucerne as hay or chaff; another ration, equally suitable, but not quite so rich, may be made up by using 40 lb. of the former and 20 lb. of cowpea chaff. The nutritive ratios of the fodders noted work out at 1 : 4·73 and 1 : 6·16, respectively. Analyses of fodders and silage present many variations. A general average per head per day for the support of a number of milch cows, when other feed is scarce, may be set down at 40 lb. of maize silage and 15 lb. of lucerne chaff. With this as a basis, the feeder is in a position to use his intuition and judgment in dealing with the individuality of animals.

QUEENSLAND TREES.

By C. T. WHITE, F.L.S., Government Botanist, and W. D. FRANCIS, Assistant Botanist.

No. 19.

THE SCRUB BEEFWOOD.

The Scrub Beefwood (*Stenocarpus salignus*) is not a very well-known tree in Queensland, except in the extreme south-eastern portion of the State. The trees attain a height of about 80 feet with a barrel diameter of about 2 feet. The barrel is sometimes flanged at the base. The bark is brown, often finely wrinkled or striated, and when cut is seen to be brownish pink in colour. The species is found in the rain forests ("scrubs") of Eastern Australia from Illawarra, New South Wales, to the south-eastern part of Queensland, in and around the Macpherson Range. The timber is of the silky oak type, and is used for purposes in which silky oak is employed.

Photo. by the Authors.]

Plate 65.—Scrub Beefwood (*Stenocarpus salignus*).
A tree in the rain-forest of Roberts Plateau, National Park.

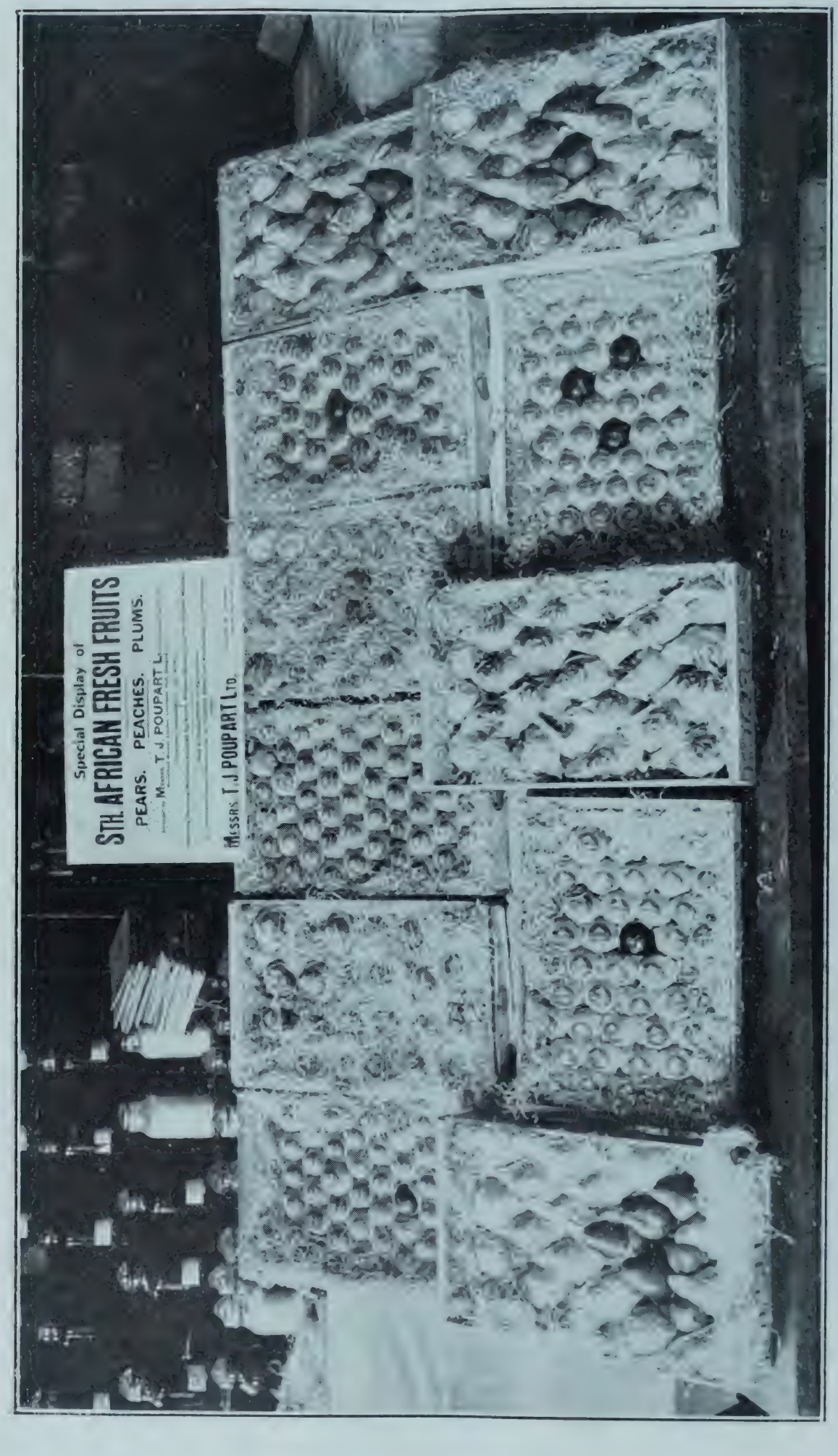


Photo: H. W. Mobsby.]

PLATE 66.—A SAMPLE PACK OF AFRICAN FRUITS FOR ENGLISH MARKETS. EXHIBITED A.N.A. EXHIBITION, MELBOURNE.

Photo: H. W. Mobsby.]

PLATE 67.—THE QUEENSLAND EXHIBIT, AUSTRALIAN NATIVES' ASSOCIATION EXHIBITION, MELBOURNE, 1923.

STUD STOCK STUDIES.

BEST BREEDS OF PIGS FOR QUEENSLAND CONDITIONS.*

BERKSHIRE.

This is the most popular breed in Queensland, and is acclimatised. It readily suits itself to the surroundings under which it is kept.

Characteristics of the breed may be described as follows:—

The Berkshire is symmetrical in outline, a good grazer, fattens rapidly, and when kept growing from birth should be fit for the bacon curer at from five to six months, and weigh when dressed from 100 to 120 lb., thereby furnishing a range of weight favoured by bacon manufacturers.

Colour, black, with a plentiful supply of fine-textured hair; white blaze on face; white feet; and white tip to a curly tail. Above medium size; head broad with decidedly dished face; ears thin, velvety in texture, erect, rather inclined forward; jowl full and carrying well back. Chest, wide and deep. Back, long and straight. Ribs, well sprung. Belly, deep, with full and thick flanks, giving good underline. Hams, broad, deep and fleshy down to the hocks. The pig should be well and firmly set on his legs, which must be short, straight, and nicely set apart. Action, smart and active, with an even, regular gait. A good thrifty, all-round pig, admirably suiting practically every district in the State.

The Berkshire has a robust constitution and is of a docile temperament, and rapidly responds to good food and care.

Berkshire sows make good mothers; they are fairly prolific, and litters of from eight to ten are not uncommon in well managed herds.

YORKSHIRE.

Of the three kinds originally brought to this State—viz., Large, Middle, and Small York—the Middle York alone has maintained popularity.

As a distinct white breed it has many excellent qualities, but these are discounted by the fact that unless the pigs have access to plenty of shade and grow an abundance of hair to protect them, they become scurfy in the skin on exposure or sunburn rapidly.

This drawback limits the distribution of this breed to the more temperate parts of the State.

The Mid. York is a hardy, robust, good constitutioned pig, with early maturing characteristics. It possesses a distinctive capacity to fatten evenly and rapidly, but if kept too long in the fattening pen has a tendency to lay on too thick a layer of back fat.

Other characteristics of the breed are as follows:—

Colour, distinct white with pink skin, showing a freedom from blue-coloured spots or markings.

Medium in size and of an even, symmetrical, well-rounded appearance.

Head, short, wide between the ears; face, dished.

Except for the above distinctions and a pure white, abundant coat of silky hair, the other attributes of the breed are to be considered as in the same category as the Berkshire.

*From "Pig Raising in Queensland" (E. Graham and H. C. Quodling), Dept. Agriculture and Stock, Q., Oct., 1922.

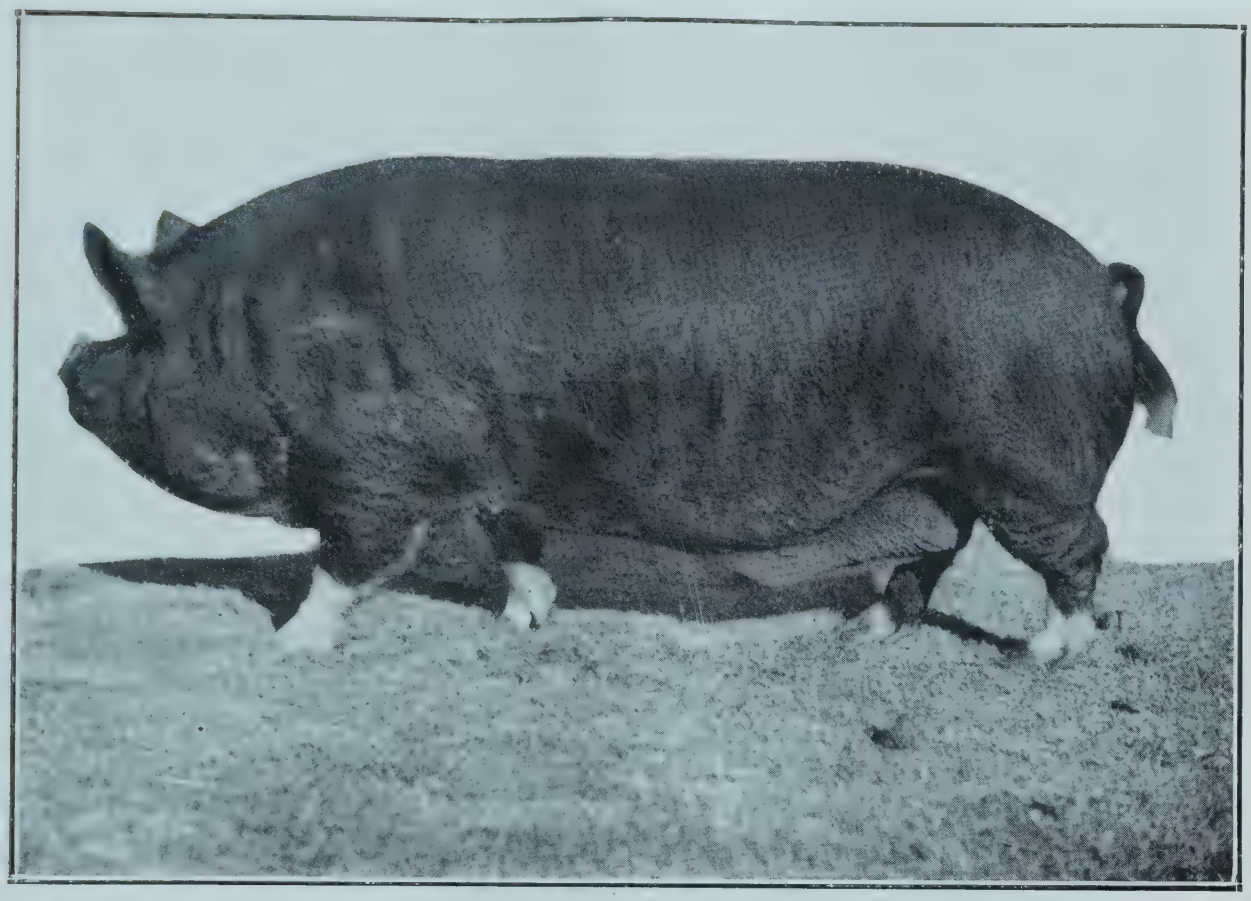


Plate 68.—Berkshire Boar.

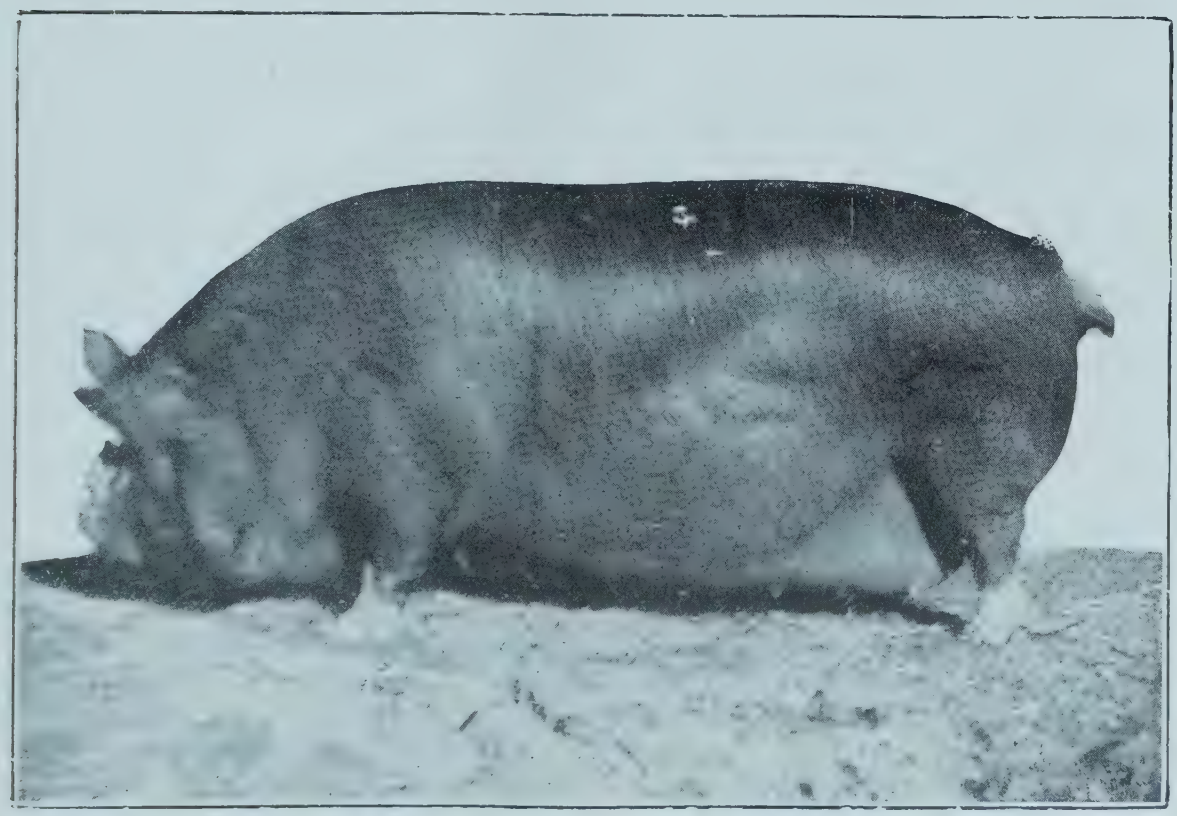


Plate 69.—Berkshire Sow.

PLATE 70.—MID-YORK BOAR.

PLATE 71.—MID-YORK SOW.

AN OUTSIZE EGG.

"It is the biggest hen's egg I have ever seen," said the Government Poultry Expert, when displaying recently an enormous hen egg. Mr. Beard explained that the egg was laid by a Black Minorca hen, fifteen months of age, the property of Miss Paxton, of Kelvin Grove. The egg measured 9¼ in. by 8¼ in., and weighed 6¾ oz. One egg previously laid by the young Minorca weighed 4 oz. Nine days after laying her mammoth egg the hen died. The egg was opened by Mr. Beard in the presence of the owner, and it was found to contain another ordinary full-sized egg, perfectly shelled. The space between the shell of the big egg and that of the smaller one contained only albumen, no yolk, but the smaller egg contained the yolk, and no albumen. In only two previous instances has Mr. Beard known of such a freakish occurrence, but in neither of these previous cases was the egg nearly so large.

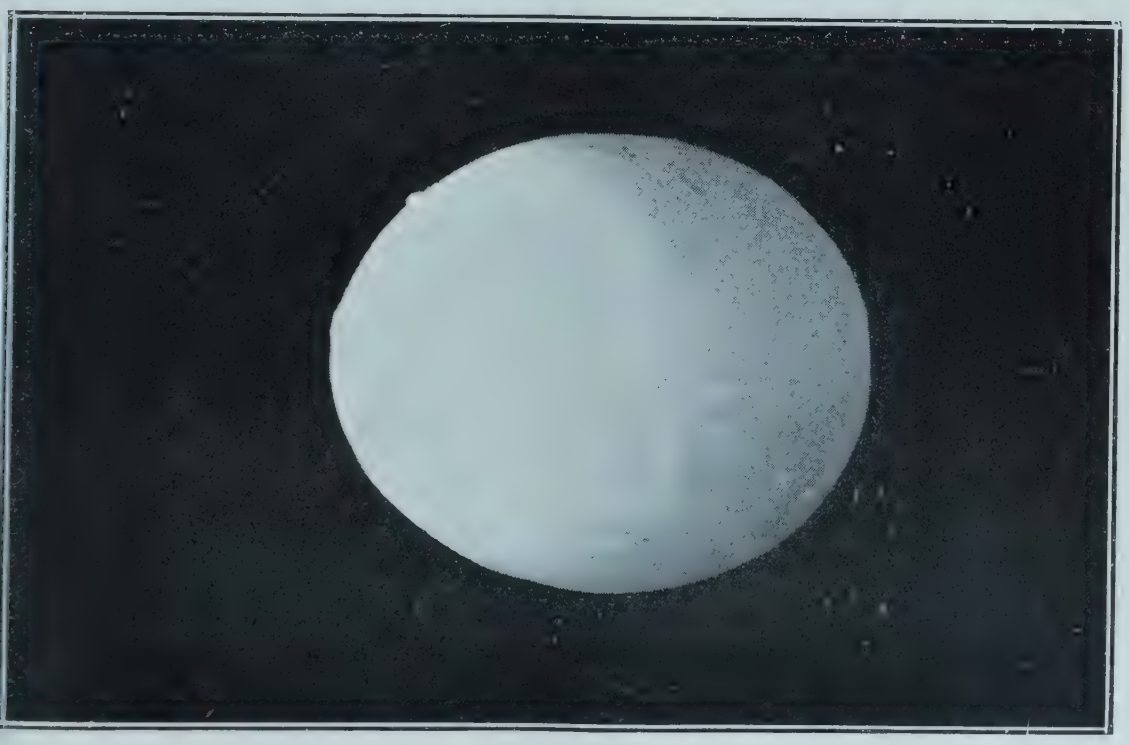


PLATE 72.

SMOKING OUT A PEST.

An Important Cotton Field Experiment.

An important and efficacious experiment in dealing with a cotton pest was conducted at Whinstanes, near Pinkenba, recently, in the presence of Messrs. G. Evans (Cotton Specialist, E.C.G.C.), W. G. Wells (Cotton Adviser), and C. Clydesdale (Assistant Instructor in Agriculture). On a Duranga seed (stud) plot of 5 acres there was a fine-looking crop, and since the late rains a new flush of flowers and squares had come along. It had been noticed, however, that a large proportion of the

PLATE 73.—SMOKING OUT A PEST—THE COTTON FIELD BEFORE FIRING.

squares were dropping off, and an examination disclosed that the crop had been attacked by a kind of worm.

Walking through the fields the experts discovered a moth that was there in countless numbers, and was busy laying eggs in the young squares. The grub was boring into the squares, and the boll was dropping off, which meant that all prospects of a good crop were being ruined. It was therefore deemed highly desirable to try

PLATE 74.—SHOWING STACK OF TARRED RUBBISH TO WINDWARD OF THE COTTON ROWS.

to drive out the moth before it affected all the squares. An experiment was arranged in the form of a small series of fires to windward of the plot. The fires were built up out of dead grass, leaves, and twigs, with a little coal tar added. This gave off dense smoke, which was carried through the plot by the wind, and had the effect of driving out all the moths. A flight of swallows followed the fugitives. The experiment was repeated in order to clear out any stray moths.

"This was an interesting experiment," said Mr. Evans, "and if, as we hope, it proves efficacious, it has the great advantage of being applicable on a large scale,

Plate 75.—Well Alight.

and any farmer can adopt it. If the experiment had not succeeded the crop referred to would have been reduced 25 to 30 per cent."

There is a good lot of these insect pests on the coastal belt, he added, and there was going to be a stiff fight against them. The experiment was first tried in the Central district, where the maize worm had attacked a cotton crop. It was such a success that it was decided to repeat it to free cotton of the boll worm.

Further experiments will be carried out in the Dawson Valley. The accompanying illustrations show various phases of the experiment:—

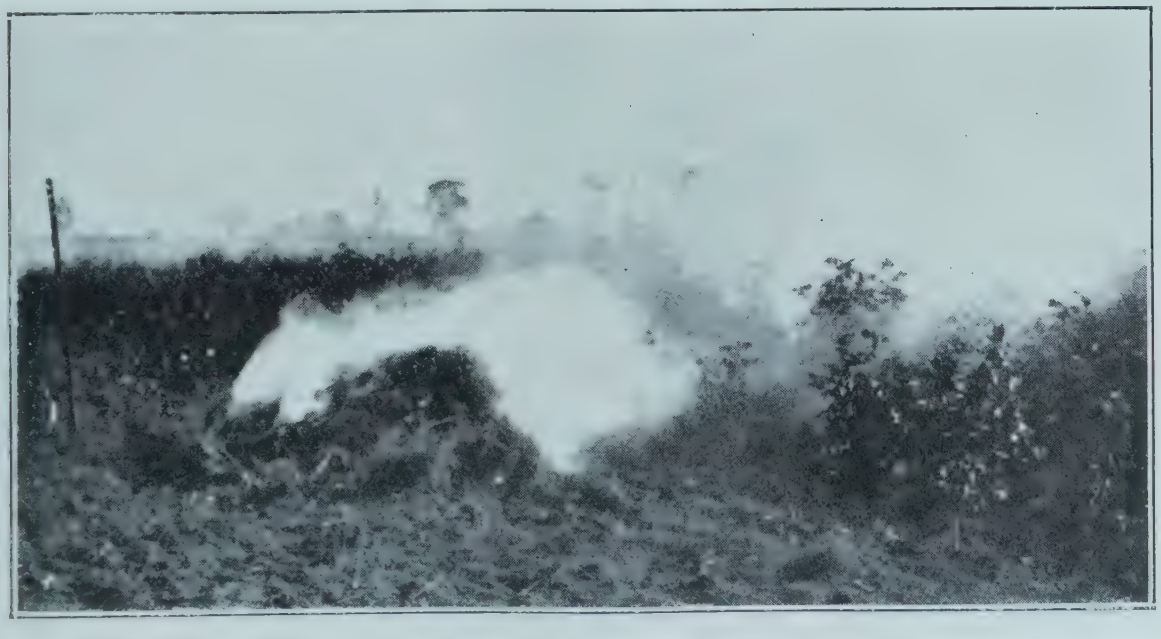


Plate 76.—A Burning Stack.

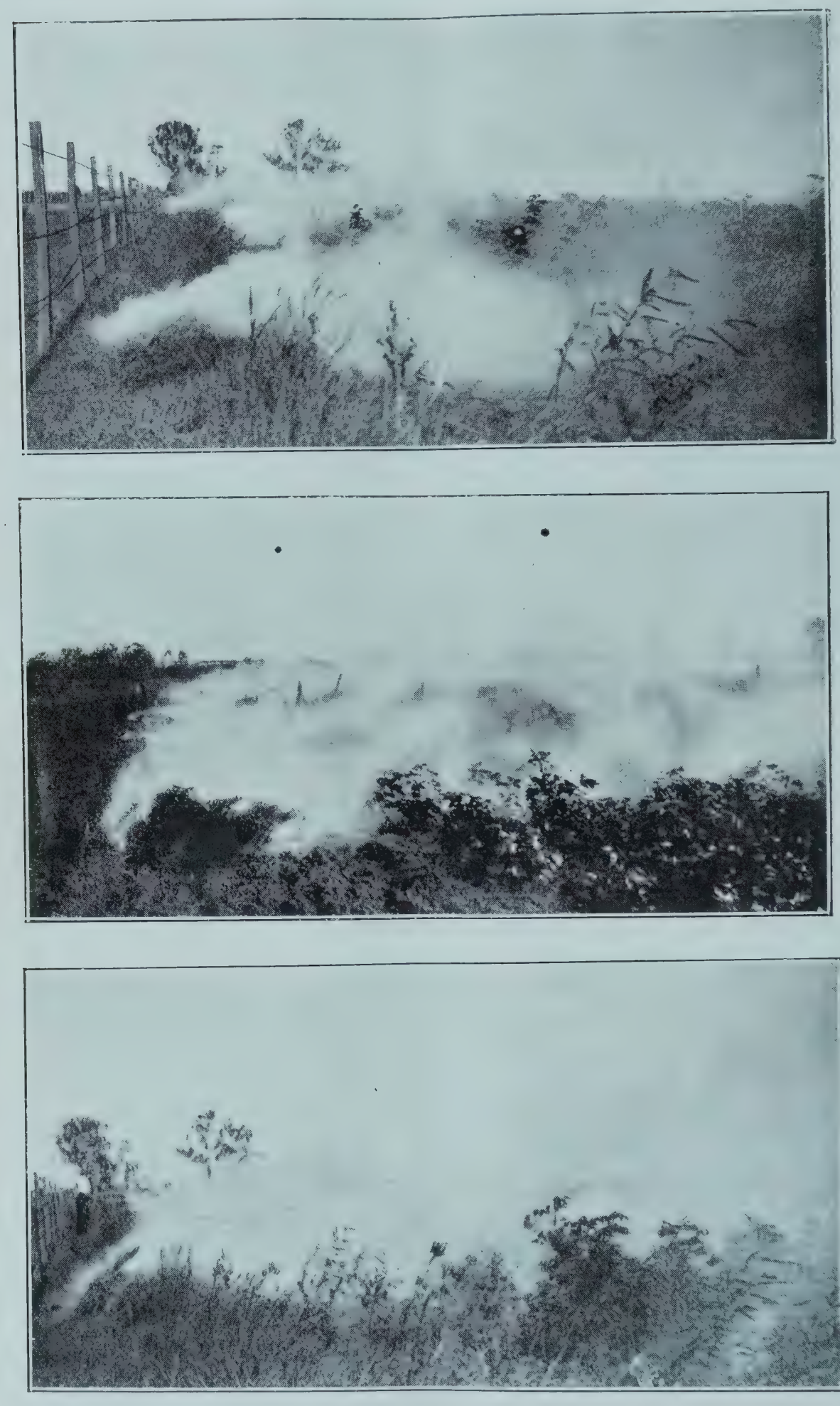


PLATE 77.—AN EFFECTIVE SMOKE SCREEN.

HOW TO PICK COTTON.

Modern Methods.

Cotton picking is the great problem of the cotton growing industry, though certainly not the only one that will have to be contended with in Australia. Many attempts have been and are still being made to perfect a mechanical picker, but so far without much success. The best brains in America have devoted time and study towards solving this world-wide problem, without so far achieving any definite result.

Plate 78.—Cotton Seven Weeks Old, W. Kraatz's Farm, Tallegalla.

Still, there is hope for the future, and it is quite possible that a mechanical picker can be perfected that will pick cotton for ¾d. per lb. It has been pointed out that in pre-war days, in America, the cost of picking was ½d. per lb., and that at that price not much incentive was given to develop a picking machine. Now, however, with the rapid rise that has taken place in the cost of living in that country, and the

Plate 79.—Cotton Eleven Weeks Old, W. Kraatz's Farm, Tallegalla.

consequent rise in wages and the cost of picking, inventors and engineers are now turning to the perfecting of a machine that will assist very materially the old hand method. Already in this country several people have taken up the problem of machine picking seriously, and Australians, with their proved inventive ability, can be relied upon to tackle the task, as they have others, that, on the surface, seemed impossible.

Hand Picking.

For the present the hand picking of cotton is the only way there is of harvesting the crop, and the British-Australian Cotton Association, Limited, furnishes the following useful hints and suggestions, which will enable pickers to do the work in the best way and with the least cost. Cotton picking may be a little tedious, but it is certainly not laborious. It calls for a quickness of the hand and eye, and a degree of physical strength not apparent to an onlooker. The methods of picking followed are numerous. In Queensland last season many people picked into kerosene tins, which were then emptied into large sacks. Others had a small bag that was fastened on in front of them and would hold about 10 lb. of cotton. The drawback of this method, as with the kerosene tins, is that one loses time emptying it, and the weight of the cotton is all on the body. This hampers movement.

PLATE 80.—THE 300TH OF THE GINNED BALES AT WHINSTANES FOR EXPORT TO LANCASHIRE.

Use Suitable Bags.

The usual American picker uses a canvas bag about 2 ft. wide and 8 ft. long. A simple, cheap, and very serviceable cotton picking bag to correspond to this can be made in the following manner:—Take two corn-sacks and sew them together from top to bottom, cutting the bottom of one. This will give a bag 8 ft. long. Tie a strap on top of this bag to go over the right shoulder so that the mouth of the bag is on the left side just above the hip. If the two ends of the strap are tied on to the bag, at a distance apart of less than half the circumference, the mouth of the bag will always stay open. This bag will cost 1s., can be made in a few minutes, and will be found to last for a considerable period. The bag is dragged on the ground between the rows behind the picker; there is no weight on the picker's shoulders, and it will hold about 40 lb. of cotton.

A Warning.

Many erroneous ideas exist here as to cotton picking, one being that cotton must be picked as soon as the boll opens. This, the Association points out, has resulted in pickers going over their fields numerous times, with the consequently low tally and high cost of picking. The cotton can remain on the bush for at least two or three weeks without being damaged. Nature protects the cotton fibre by enclosing it in wax, and the seed cotton is non-absorbent. A continuous rain for many days would,

Photo. by D. W. T.]

Plate 81.—Mr. James Todd's Cotton Field, Mountain View, Biggenden.

Photo. by D. W. T.]

Plate 82.—A Promising Cotton Crop, Mountain View, Biggenden.

Photo. by D. W. T.]

PLATE 83.—AMONG THE FIELDS OF COTTON, MOUNTAIN VIEW, BIGGENDEN.

Photo. by D. W. T.]

PLATE 84.—THE MOUNTAIN VIEW HOMESTEAD.

of course, tend to stain the cotton and lower the grade, but a day or two of heavy rain, such as is likely to be experienced here, followed by a sunny day, would not stain or damage cotton. Field experts have seen a Queensland field of opened cotton, on which during May and June 10 in. of rain fell, and yet not over 1 per cent. of the cotton was damaged. Operators should wait until one-quarter or one-third of the cotton is open before starting to pick. Three pickings over the field will be all that is necessary; and the last one being made after the frost has checked the bush and opened all the green bolls.

Rough Grading in the Field.

In many cases two pickings will be quite sufficient, the first taking the biggest percentage of the crop. Do not mix the cotton from the separate pickings—send them to the gin as picked. The last picking after the frost has checked the bush is usually of a lower grade owing to the presence of immature cotton, and should always be sent to the ginnery separately, never mixed with the previous pickings.

How to Pick.

In picking, the operator should start on the outside row, and pick one row at a time. They will find faster picking can be done than by taking two rows at once. They should work their rows so that the long bag is dragging between two picked rows and so not damaging any open cotton bolls. The American picker wears leather knee pads, going on one knee to pick the bottom bolls. The art in cotton picking is to work with both hands, each independent of the other. The actual picking is not a straight pull out, but the fingers and thumb fit into the lock of the boll and the hand is given a twisting or levering motion, bringing the cotton away. A good picker will pick three or four bolls, keeping the cotton in his hand before transferring it to his bag. This is an economy of motion, and will save thousands of movements of the hand in a day. In commencing picking, get into the right method from the start; speed will come later. Pick with two hands at the same time. Avoid getting leaves and trash in with the cotton, and do not commit the worst cotton picking offence —leaving a part of the cotton in the open boll. Cotton left in this way is lost, as no picker could be expected to get these small pieces in a following picking. By leaving a small piece of cotton in every boll a good percentage of the crop would be left on the bushes. Pickers need not lose time in the morning waiting for the dew to dry. The cotton can be picked with the dew on it, but that cotton must be spread out in the sun and dried. After rain, wait until the cotton is dry before picking. Be careful not to pick green or immature cotton, that is, cotton from partly opened bolls. This cotton is damp, and can be instantly recognised from the fully matured and dry cotton. Cotton that is dry and from fully opened bolls requires no drying or treatment after being picked. It can be packed into bales or sacks in the field, so avoiding any unnecessary handling.

Packing.

The ordinary woolpack will hold about 350 lb. tramped in with the feet, the chaff sack about 90 lb. The Australian Cotton Association will return a woolpack to growers in place of the one received on receipt of 6d. each to cover handling and freight. No chaff sacks will be returned. Woolpacks cost about 3s. 6d. each, and can be used many times. All bales or sacks must be plainly branded with the grower's name and address. This will avoid confusion and the trouble of identifying packages. In the field a frame could be made to hold the woolpack, and the pickers empty their bags into it, and the cotton tramped into the bale. Where chaff sacks are used a slide about 3 ft. wide and 6 ft. long having a platform of this size 4 ft. from the ground will be found very serviceable. At one end of the platform is a circular opening with a hinged iron ring, to which the sack is fastened. The cotton is emptied out on to the platform and some one standing in the bag hole tramps it in. When the sack is full, the back of the bag hole is detached, releasing it. The advantage of this to the cotton packer is that being on a slide it can be hauled about to any part of the field, thus avoiding long carries by the pickers of their full bags.

Pickers' Prospects.

The amount of cotton picked in a day depends on the ability and quickness of the pickers, the yield per acre, and the cleanliness of the crop. A field free from weeds means a cheaply picked crop, and this fact should not be lost sight of in the growing and cultivation of cotton. In starting out, if a man picks around 75 lb. in eight hours, he will be doing very well. Speed will come with experience, and in a few weeks he should work up to 100 lb., and if he is going to make a cotton picker will surpass this figure in good average cotton. Growers should have in the field a scale to weigh the pickers' cotton as they bring their bags in, and three or four weighings during the day will be found quite sufficient.

The acreage of cotton that one man will be able to pick will, of course, depend in great part on the yield per acre, and his ability. A man who can devote all his time to picking will be able to handle 8 acres. This is taken for a very conservative case of a yield of 800 lb. of seed cotton to the acre, and an average daily picking of 80 lb. This crop would require 80 days' picking, and allowing 20 working days to the month, this will mean continuous work for four months, which is the average length of the picking season in this country. White American pickers do from 150 to 200 lb. a day, and it is felt to be certain that Australians, when they take up cotton picking seriously, will equal, if not surpass, this. The best cotton picker one expert ever saw was an American, who averaged 300 lb. for a nine-hour day over a considerable period. This was done in a field that went 2,300 lb. seed cotton to the acre, and in which only two pickings were made. He points out that this is, of course, an exceptional record.

Fire Prevention.

Great care must be taken to avoid getting matches, pieces of metal, or other material in with the cotton. The cotton is very inflammable, and a spark in the machine during the process of ginning, will instantly cause a fire. The gin is a series of small circular saws, set close together on a spindle, and running between steel ribs, so that a match or piece of metal striking the saws may result in a fire, the metal also damaging the teeth of the saw. Last season many fires occurred in the gins at Whinstanes and Rockhampton, due, in every case, to foreign material in the seed cotton. The collection of articles rescued from last season's cotton was wide and diversified, ranging from pumpkins and eggs to watches and clothing. Corn cobs are a source of much trouble, as they are readily carried to the saws by the fibres adhering to them, and holding them against the breast, thus causing great damage to the saws, the teeth of which are thus broken. The bagging of the cotton in the field as suggested will avoid the inclusion of these articles, and growers should prohibit the use of wax matches by pickers or any one handling the cotton. A spark from a cigarette falling into a bag of cotton may smoulder away for days before reaching the air, and bursting into flames. This matter is important, and too much care cannot be taken to lessen the risk of fire in cotton gins.

DENTITION OF SHEEP.

Age.	Incisors.		Molars.		Number.		
TEMPORARY.							
Period.	No.	Position.	No.	Position.	Temp.	Perm.	Total.
At birth or soon after	2	Central	..	..	..	..	..
	2	Lateral	..	..	..	..	..
	..	Central	..	..	20	..	20
	2	Lateral	12	1st, 2nd, 3rd	..	..	..
	2	Corner	..	..	..	..	..
PERMANENT.							
3 months	..	..	4	4th	20	4	24
9 months	..	..	4	5th	20	8	28
Early. Late Yr. m. Yr. m.							
1 0 1 4	2	Central	..	..	18	10	28
1 6 2 0	2	Lateral, Central	16	6th and 1st, 2nd, 3rd	4	28	32
2 3 2 9	2	Lateral	..	..	2	30	32
2 9 3 3	2	Corner	..	..	0	32	Full mouth

Formula of Temporary Teeth.

$$\frac{M.}{3} \quad \frac{I.}{0} \quad \frac{M.}{3} = \frac{6}{14} = 20.$$

Formula of Permanent Teeth.

$$\frac{M.}{6} \quad \frac{I.}{0} \quad \frac{M.}{6} = \frac{12}{20} = 32.$$

MAJOR A. H. CORY, M.R.C.V.S.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, MARCH, 1923.

Owing to the dates on which the Easter holidays fell this year, all birds were held until 3rd April, the eggs being counted up to the evening of 2nd, thus making the period of laying 365 days. The weather at the beginning of March was very warm, with hot winds, giving the birds a bad time. There were four deaths, two from apoplexy, one from bowel trouble, and one from peritonitis. The egg production for the year was very satisfactory considering the poor start made at the beginning of the contest. The laying of the light breeds was good, there being very few cases of broodiness to be recorded. On the other hand, with the exception of a few pens, there was a great deal of broodiness amongst the heavy breeds. The team owned by R. Burns finished well, none of his birds having been broody. Mr. N. A. Singer's B bird was still going strong at the close, with 311 eggs, and looked like continuing for another term. The following are the individual records:—

Competitors.	Breed.	March.	Total.
	LIGHT BREEDS.		
*N. A. Singer	White Leghorns ...	113	1,604
C. H. Singer	Do.	109	1,551
*W. and G. W. Hindes	Do.	87	1,450
*Bathurst Poultry Farm	Do.	93	1,352
*S. L. Grenier	Do.	86	1,311
*R. Gill	Do.	79	1,306
*J. M. Manson	Do.	78	1,293
*Mrs. L. Andersen	Do.	87	1,287
*W. Becker	Do.	73	1,273
*H. P. Clarke	Do.	68	1,272
*J. W. Newton	Do.	61	1,235
*G. Trapp	Do.	35	1,232
*W. A. Wilson	Do.	62	1,225
*F. Birchall	Do.	104	1,204
*G. Williams	Do.	47	1,166
*C. Goos	Do.	44	1,162
A. G. C. Wenck	Do.	70	1,162
*R. C. J. Turner	Do.	52	1,157
*R. C. Cole	Do.	51	1,155
*Oakleigh Poultry Farm	Do.	48	1,148
J. H. Jones	Do.	34	1,145
*O. Goos	Do.	56	1,126
*Thos. Taylor	Do.	89	1,122
*H. Fraser	Do.	70	1,121
*Mrs. R. Hodge	Do.	54	1,090
*Mrs. E. White	Do.	57	1,079
*T. Fanning	Do.	25	1,078
N. J. Nairn	Do.	32	1,070
*J. W. Short	Do.	54	1,064
*M. F. Newberry	Do.	35	1,048
*C. M. Pickering	Do.	50	1,038
*E. A. Smith	Do.	68	1,034
B. Hawkins	Do.	40	1,019
A. Maslin	Do.	51	1,011
T. H. Craig	Do.	18	1,002
J. Purnell	Do.	53	989
E. Symons	Do.	69	967
E. Stephenson	Do.	57	951
H. Trappett	Brown Leghorns ...	43	941
G. F. Richardson	White Leghorns ...	20	933
B. C. Bartlem	Do.	23	904
A. Anders	Do.	39	901
Brampton Poultry Farm	Do.	26	879
Parisian Poultry Farm	Brown Leghorns ...	16	590

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	March.	Total.
HEAVY BREEDS.			
*R. Burns	Black Orpingtons ...	127	1,488
*A. E. Walters	Do.	72	1,216
*C. C. Dennis	Do.	85	1,165
*T. Hindley	Do.	67	1,156
*R. Holmes	Do.	65	1,119
*E. F. Dennis	Do.	56	1,097
Jas. Hutton	Do.	43	1,092
Mrs. A. Kent	Do.	69	1,068
Mrs. A. E. Gallagher	Do.	65	1,050
H. B. Stephens	Do.	86	1,044
*H. M. Chaille	Do.	45	1,033
Mrs. L. Maund	Do.	62	1,028
*Parisian Poultry Farm	Do.	83	987
*Jas. Potter	Do.	52	980
R. Innes	Do.	18	977
Wambo Poultry Farm	Do.	82	944
V. J. Rye	Do.	58	944
W. Becker	Chinese Langshans ...	35	911
C. Doan	Black Orpingtons ...	37	901
*Rev. A. McAllister	Do.	27	901
C. Rosenthal	Do.	65	870
Jas. Hitchcock	Do.	50	858
W. C. Trapp	Do.	56	801
R. Burns	Silver-laced Wyandottes	32	713
*J. E. Smith	Plymouth Rocks ...	19	639
*Miss L. Hart	Rhode Island Reds ...	21	534
Total	...	4,003	75,163

* Indicates that the pen is being single tested.

DETAILS OF SINGLE HEN PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total
LIGHT BREEDS.							
N. A. Singer	226	311	237	281	254	295	1,604
W. and G. W. Hindes	253	222	245	238	258	234	1,450
Bathurst Poultry Farm	173	217	242	239	268	213	1,352
S. L. Grenier	201	166	228	227	240	249	1,311
R. Gill	246	219	245	236	153	207	1,306
J. M. Manson	235	176	222	198	236	226	1,293
Mrs. L. Andersen	245	179	226	213	222	202	1,287
W. Becker	201	170	223	214	228	237	1,273
H. P. Clarke	217	205	201	232	207	210	1,272
J. W. Newton	222	211	244	194	204	160	1,235
Geo. Trapp	222	184	212	238	176	200	1,232
W. A. Wilson	215	189	158	223	214	226	1,225
F. Birchall	198	229	170	154	237	216	1,204
G. Williams	183	208	213	207	191	164	1,166
C. Goos	142	177	188	215	254	186	1,162
R. C. J. Turner	195	169	219	202	203	169	1,157
R. C. Cole	231	182	213	161	187	181	1,155
Oakleigh Poultry Farm	203	160	205	179	191	210	1,148
O. Goos	185	179	206	223	203	130	1,126
Thos. Taylor	202	164	190	194	194	178	1,122
H. Fraser	197	215	192	153	155	209	1,121

EGG-LAYING COMPETITION—*continued.*

DETAILS OF SINGLE HEN PENS—*continued.*

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS—*continued*							
Mrs. R. Hodge	227	154	171	157	229	152	1,090
Mrs. E. White	197	124	231	148	153	226	1,079
T. Fanning	135	183	203	172	235	150	1,078
J. W. Short	170	166	209	158	186	175	1,064
M. F. Newberry	179	152	161	234	137	185	1,048
C. M. Pickering	208	211	113	163	176	167	1,038
E. A. Smith	163	157	181	192	162	179	1,034
HEAVY BREEDS.							
R. Burns	238	241	229	278	244	258	1,488
A. E. Walters	199	158	164	203	260	232	1 216
C. C. Dennis	183	205	202	180	197	198	1,165
T. Hindley	165	197	130	257	238	169	1,156
R. Holmes	151	209	209	180	175	195	1,119
E. F. Dennis	164	188	213	110	205	217	1,097
H. M. Chaille	189	168	199	162	195	120	1,033
Parisian Poultry Farm	123	160	198	134	180	192	987
J. Potter	158	177	182	144	188	131	980
Rev. A. McAllister	158	183	159	113	95	193	901
Miss L. Hart	81	111	64	126	76	76	534

CUTHBERT POTTS, Principal.

NATIONAL UTILITY POULTRY BREEDERS' ASSOCIATION COMPETITION, ZILLMERE.

FINAL REPORT.

The 1922-23 Zillmere Single Pen Competition was concluded on 31st March. In order to permit of the pens being thoroughly cleansed before the new competition, all birds which were not in a leading position were returned shortly after the middle of the month. This accounts for the apparently low scores recorded by some of the birds this month. The highest individual score for the period of the competition was 295 by a white Leghorn, the property of Mr. J. J. Davies, of Mount Gravatt. Another Leghorn held second place with 281 eggs. Mr. A. Cowley, of the Soldiers' Settlement, Enoggera, being the owner. In the black Orpington section Mr. E. F. Dennis, Kelvin Grove, won with a bird laying 267 eggs, while Mr. T. J. Carr, of King's Creek, was successful in the other varieties with a silver-laced Wyandotte, which laid 219. Certificates were given for all birds laying 250 eggs and over, the following owners being successful:—

WHITE LEGHORNS.

A. Neil, Cannon Hill	256
J. Hutton, Kingsthorpe	260
Oakleigh Poultry Farm, Sunnybank	264
J. Purnell, Torwood	272
P. J. Fallon, Toowoomba	255
J. J. Davies, Mount Gravatt	295
W. H. Lingard, Greenslopes	251
H. Sturman, Birkdale	252
H. Sturman, Birkdale	268
G. Trapp, Toowoomba	258
G. Trapp, Toowoomba	275
A. Cowley, Enoggera	281
R. D. Chapman, Newmarket	262
A. Hodge, Kelvin Grove	263

BLACK ORPINGTONS.

C. C. Dennis, Yeronga	251
E. F. Dennis, Kelvin Grove	267
R. A. Boulton, Deagon	251

Mr. H. Sturman, Birkdale, wins the winter aggregate for first four months of competition, and Mr. J. J. Davies, Mount Gravatt, the aggregate for the period of the competition with 540 eggs. The light variey type prize went to Mr. M. J. Lyons, Fig-tree Pocket, and heavy variety type prize to Mr. H. Pearce, Nundah.

Details:—

Pen No.	Owner.	March.	Total.	Pen No.	Owner.	March.	Total.
	WHITE LEGHORNS.						
43	J. J. Davies ...	23	295	14	J. Hutton ...	22	217
29	A. S. Walters ...	19	286	20	L. Andersen ...	13	215
66	A. Cowley ...	20	281	49	R. Turner ...	6	215
64	G. Trapp	20	275	9	P. Ruddick ...	10	214
34	J. Purnell ...	22	272	73	A. F. Knowles ...	12	207
7	J. Harrington ...	22	269	80	W. Bliss	17	207
62	H. Sturman ...	17	268	19	L. Andersen ...	0	205
27	Oakleigh Poultry Farm	18	264	22	E. Stephenson ...	6	204
				76	A. J. Bourne ...	12	204
70	A. Hodge ...	18	263	16	T. Flood	14	204
68	R. D. Chapman ...	24	262	8	J. Harrington ...	12	204
13	J. Hutton ...	22	260	78	Kelvin Poultry Farm	15	203
53	A. W. Ward ...	18	259				
63	G. Trapp	20	258	57	M. Newberry ...	4	202
1	A. Niel	0	256	36	Parisian Poultry Farm	7	197
39	P. J. Fallon ...	16	255				
25	P. F. Adams ...	15	253	82	E. C. Raymond ...	11	195
79	W. Bliss	16	253	31	R. H. Woodcock	12	193
61	H. Sturman ...	17	252	59	C. Pickering ...	13	193
55	W. H. Lingard ...	21	251	17	R. Shaw	5	192
52	F. R. Koch ...	18	250	11	J. Potter	4	188
12	J. Potter	16	248	5	Wombo Poultry Farm	6	188
44	J. J. Davies ...	16	245				
77	Kelvin Poultry Farm	9	244	6	Wombo Poultry Farm	0	186
72	Enroh Pens ..	9	241	3	W. Becker ...	4	186
24	M. H. Campbell...	22	241	81	E. C. Raymond ...	3	182
54	W. Ward ...	19	240	38	Carinya Poultry Farm	0	179
40	P. J. Fallon ...	15	239				
23	M. H. Campbell...	19	239	48	M. J. Lyons ...	0	176
10	P. Ruddick ...	14	237	65	A. Cowley ...	1	176
33	J. Purnell ...	9	233	15	T. Flood	9	175
46	H. Needs ...	12	231	60	C. Pickering ...	12	169
56	W. H. Lingard ...	20	229	22	E. Stephenson ...	11	166
18	R. Shaw	16	227	71	Enroh Pens ...	2	166
26	P. F. Adams ...	9	227	75	A. J. Bourne ...	1	162
67	R. D. Chapman ...	1	225	50	R. Turner ...	1	161
35	Parisian Poultry Farm	12	222	45	H. Needs ...	0	154
				4	W. Becker ...	2	154
47	M. J. Lyons ...	13	221	69	A. Hodge ...	1	136
41	G. Williams ...	12	220	32	R. H. Woodcock	0	128
51	F. R. Koch ...	16	223	74	A. F. Knowles ...	0	123
58	M. Newberry ...	15	219	28	Oakleigh Poultry Farm	0	107
37	Carinya Poultry Farm	9	218	2	A. Niel	17	59
30	A. S. Walters ...	17	217				

NATIONAL UTILITY POULTRY BREEDERS' ASSOCIATION COMPETITION, ZILLMERE—*continued.*

Pen No.	Owner.	March.	Total.	Pen No.	Owner.	March.	Total.
	BLACK ORPINGTONS.						
92	C. C. Dennis ...	12	275	87	W. A. Blake ...	2	185
88	W. A. Blake ...	15	274	100	L. J. Pritchard ...	0	184
93	E. F. Dennis ...	23	267	104	J. Potter	7	180
96	R. A. Boulton ...	6	251	86	Kidd Bros. ...	0	179
91	C. C. Dennis ...	18	251	109	Wambo Poultry Farm	14	169
108	E. Walters ...	16	248				
89	T. Brotherton ...	9	234	102	Parisian Poultry Farm	0	167
111	A. Niel	18	230				
105	H. Pearce ...	15	225	98	Enroh Pens ...	9	166
107	E. Walters ...	4	219	110	Wambo Poultry Farm	0	165
95	R. A. Boulton ...	0	214				
101	Parisian Poultry Farm	13	213	83	J. Hutton ...	1	158
				97	Enroh Pens ...	1	157
103	J. Potter	7	204	90	T. Brotherton ...	1	162
84	J. Hutton ...	17	204	99	L. J. Pritchard ...	0	131
112	A. Niel	19	197	94	E. F. Dennis ...	3	117
106	H. Pearce ...	17	191	85	Kidd Bros. ...	0	10
	OTHER BREEDS.						
120	T. J. Carr (S.W.)	20	229	114	Parisian Poultry Farm (B.L.)	16	182
119	T. J. Carr (S.W.)	16	219				
116	G. and W. Hindes (B.L.)	6	194	118	J. H. Jones (W.W.)	4	180
				113	Parisian Poultry Farm (B.L.)	5	141
115	G. and W. Hindes (B.L.)	18	192				
				118	J. H. Jones (W.W.)	0	120

TO POULTRY KEEPERS.

Notwithstanding repeated warnings by the Queensland Society for the Prevention of Cruelty and public reproaches in the Press, crates of poultry continue to be consigned to market under conditions involving cruelty.

Thoughtful persons, for their own protection and in order to secure the best returns for their consignments, will follow the undermentioned directions when consigning poultry to market:—

1. Be sure that the crate is not overcrowded. (Why kill your birds prematurely?)
2. Be sure that there is ample ventilation. (A plain framework crate with wire netting sides and wire netting top, which must not sag, is the best. The public buys best what it sees best. If a wooden crate is used see that ventilation is supplied from the sides as well as from the top.)
3. Be sure that there is room for all birds in the crate to stand upright. (They must have headroom. All birds in one crate should be as nearly equal in size as possible. There will be fewer casualties, and they will look better to buyers, who are inclined to judge by the small ones.)
4. Be sure that there are no gaps between the flooring boards of the crate where birds may get their feet crushed or their legs broken. (Damaged goods are bad sellers.)
5. Be sure that water is available in the crate. (A loose tin is worse than useless. Fix syrup tins at opposite corners of the crate and see that they are filled with clean water before trucking. Your agent can also easily fill them on arrival.)
6. Be sure that food is also supplied in a fixed tin for a long journey. (A drooping, thirsty, or starving bird is a bad seller.)

7. Be sure that while waiting for consignment your birds are not left exposed to rain, wind, or sun. (You can't depend on the porter.)

8. Be sure that you do not deliver fowls, or any other birds, tied together by the legs. (We'll give you no second warning.)

9. Be sure that you do not get prosecuted for cruelty by neglecting to follow the foregoing advice. (We have inspectors at the markets every day, and court cases are costly in time, money, and reputation.)

Issued by the Queensland Society for the Prevention of Cruelty, 14 Fitzroy Buildings, Adelaide street, Brisbane. Telephone Central 647.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS FOR FEBRUARY, 1923.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			lb.	%	lb.	
Pretty Maid of Harelmar	Ayrshire ...	11 Sept., 1922	750	3·9	34·20	
Bellona	,, ...	30 Aug., ,,	690	4·2	33·90	
Royal Mistress ...	,, ...	25 Nov., ,,	750	3·5	30·60	
Confidence... ...	,, ...	13 Aug., ,,	630	4·0	29·40	
Songstress ...	,, ...	4 July, ,,	570	4·2	28·20	
College Meadow Sweet	Friesian ...	18 Sept., ,,	690	3·4	27·30	
Lady Peggy ...	Ayrshire ...	18 Dec., ,,	750	3·1	27·0	
Miss Fearless ...	,, ...	30 May, ,,	528	4·3	26·40	
College Mignon ...	Jersey ..	20 Nov., ,,	480	4·6	25·80	
Thyra of Myrtleview	Ayrshire ...	22 Aug., ,,	540	4·0	25·20	
Yarraview Snowdrop	Guernsey ...	1 Sept., ,,	420	4·9	24·30	
College La Cigale	Jersey ...	10 July, ,,	330	5·7	22·20	
Fair Lassie ...	Ayrshire ...	1 Sept., ,,	480	4·0	22·20	
Hedges Nattie ..	Friesian ...	20 May, ,,	441	4·3	22·05	
Nina	Shorthorn...	12 Jan., 1923	630	3·0	21·90	
Hedges Dutchmaid	Friesian ...	23 Sept., 1922	510	3·4	20·10	

TREATMENT OF CATTLE SUFFERING FROM THE EFFECTS OF EATING THE WILD PASSION VINE.

It is very obvious that so long as the animals are continually eating the vine, curative measures are only of temporary value. The first measures, therefore, should be taken to prevent the cattle gaining access to the vines. On farms where grazing land is scarce, efforts should be made to get rid of the injurious weed by cultivation or otherwise. This is by no means an impracticable task. The vine grows most luxuriantly in the newly-felled scrub, and such land is useless until such noxious weeds have been eradicated.

With regard to treatment of affected animals: First remove them to fresh quarters so that they are unable to obtain any more vines. They should then be given a drench of 1½ pints of linseed oil, by the mouth, in order to loosen the bowels. Epsom salts are not advisable, as in some cases there is inflammation of the bowels present. Working bullocks should be spelled until recovered. With animals in what may be termed the first stages of the disease—that is, those showing drowsiness and stupor, loss of appetite and condition, &c.—the best remedy is the injection of 18 drops or 1 c.c. of 1 per cent. solution of strychnine under the skin behind the shoulder once a day for a few days (four or five) by means of a hypodermic syringe.

For animals in the later stages, that is where convulsions are appearing, a sedative in the form of 6 drachms of Bromide of Potassium in a pint of water should be given as a drench, providing the animal is able to swallow, but it appears that in some cases this ability is lost. In such cases no drenches should be given at all, owing to the danger of the liquid going the "wrong way" and so setting up inflammation of the lungs. The strychnine should be recommended when the convulsions have disappeared.—Major A. H. Cory, M.R.C.V.S.

THE QUEENSLAND PRODUCERS' ASSOCIATION.

THE WORK OF THE PROVISIONAL COUNCIL OF AGRICULTURE REVIEWED.

A Year of Organisation and Achievement.

On 24th March, 1922, the scheme for the organisation of the Agricultural Industry in Queensland was propounded by the Premier (Hon. E. G. Theodore), at a Conference of Representatives of Dairying Interests within the State, at Brisbane. That gathering was one of the most notable in the history of Queensland and its decisions were of first importance to all engaged in rural pursuits. Out of the Premier's proposals has grown the Queensland Producers' Association, now statutorily established, and which, through its Local Producers, District Councils, and Council of Agriculture, has already laid the foundations of complete agricultural organisation within this State.

The Provisional Council of Agriculture has now handed over the guidance of the Association to the incoming Standing Council of Agriculture elected recently by the Organised Farmers of Queensland.

Subjoined is a review of definite achievements of the Provisional Council in the course of its year of service.

Agriculturists in many lands have been more or less a disunited body, but it is doubtful whether any country can boast of such a comprehensive and generous scheme of agricultural organisation as that which has been made available to the primary producers of Queensland.

The necessity for agricultural organisation had, for some time, been realised, and ultimately it was resolved by the present Government to adopt the policy of placing the farmers themselves, by organisation and State backing, in the position to give consideration to their own problems, and to evolve solutions which would be satisfactory to them. An organisation was created to embrace all agriculturists engaged in all branches of the industry and all shades of political opinion. The scheme was brought to fruition when the dairying industry was passing through a period of depression, and the outline of the Premier's proposals was submitted to a Dairy Conference held in Brisbane on the 24th March, 1922, and was unanimously approved by that conference. It was next decided to obtain legislation to govern the scheme, whereupon the Primary Producers' Organisation Act, and other agricultural legislation, introduced by the Minister for Agriculture and Stock (Hon. W. N. Gillies), was passed by Parliament in the 1922 session. The scheme embraced the following main features:—

Local Producers' Associations would form in every centre. A minimum of fifteen primary producers may form themselves into a Local Producers' Association. Every primary producer is eligible for membership.

The State is divided into nineteen districts, and all Local Producers' Associations have the right to elect the District Council.

Each of the nineteen District Councils will appoint one member to the Council of Agriculture, which holds its meetings in Brisbane.

Each District Council will have a permanent officer, known as the District Agent, who will study the problems of his district, and assist growers, Local Producers' Associations, and the District Council in improving their conditions generally. The first duly elected Council of Agriculture has now been constituted as from the 23rd

March, 1923, and will hold office until the 30th June, 1924. It is made up as follows:—

OFFICIAL REPRESENTATIVES.

The Minister (President), Department of Agriculture and Stock.
James Walker Davidson, Commissioner for Railways, Brisbane.
Arthur Ernest James Charles King Graham, Director of Dairying, Brisbane.
Harold Cecil Quodling, Director of Agriculture, Brisbane.
William Joseph James Short, General Manager, Bureau of Central Sugar Mills, Brisbane.
John Douglas Story, Public Service Commissioner, Brisbane.

Districts as per Order in Council of 21st December, 1922.	Name of Representatives elected to Council of Agriculture.
No. 1	George Henry Pritchard, Secretary, Australian Sugar Producers' Association, Edward street, Brisbane.
No. 2	William Barron Biggs, Earnestholme, Proserpine.
No. 3	Thomas Alfred Powell, Foulden, Mackay.
No. 4	Alexander Evans, Wilmott, *viâ* Larcom.
No. 5	William George Batchler, Oakwood, Bundaberg.
No. 6	Robert Livingstone Boyd, Wetheron House, Byrnestown.
No. 7	Joseph T. Tatnell, Deep Creek, Gympie.
No. 8	James Henry Sigley, Kingaroy.
No. 9	Thomas Henry Brown, Montville.
No. 10	Charles Bateman, Evandale, McMaster street, Nundah.
No. 11	Frederick Matthew Ruskin, Zillmere.
No. 12	Thomas Flood Plunkett, Beau Parc, Beaudesert.
No. 13	John Hardcastle, Dugandan.
No. 14	Thomas Cornelius Hayes, Laidley.
No. 15	George Burton, Ramsay road, Cambooya.
No. 16	James Theodore Tod, Goomburra.
No. 17	William Ranger, Eukey, *viâ* Stanthorpe.
No. 18	Allan McKinlay, Gowrie Junction.
No. 19	Robert Swan, Wallumbilla.

The State Government generously undertook to finance the whole of the organisation for the first twelve months, and a grant of £25,000 was made available to cover operations to the 30th June, 1923. The Act further provides that for the first five years the Government will subsidise the amount subscribed by agriculturists to the extent of at least £1 for £1.

With the one exception of the Director, the Council appoints all its own officers, and administers, without any direction from the Government, all the funds placed at its disposal.

During the past twelve months, a Provisional Council has been acting, and its first meeting was held on the 19th April, 1922. At this meeting the Premier (Hon. E. G. Theodore) outlined the action leading up to the constitution of the Council, and pointed out it would be the duty of the Provisional Council to lay down the policy to be pursued. A committee was appointed to draw up a plan of organisation, and it was decided to appoint a Director to organise the whole scheme. Nine delegates were appointed to visit agricultural centres and expound the scheme. Later fifteen Provisional District Agents were appointed. These called meetings and explained the proposals and the way they were designed for the betterment of the agricultural industry. That success has attained these preliminary efforts will be manifest when it is stated that there are now over 700 Local Producers' Associations with a membership of 20,000.

SPECIFIC PROBLEMS DEALT WITH—ARRANGED UNDER SECTIONAL INDUSTRIES.

DAIRYING.

Herd Improvement—Federal Aid.

The last Commonwealth Government promised to pay cost of transport and quarantine of pure bred stock imported into Australia, and the present Government has been requested to ratify that promise.

State Aid.

The State Government invited the Council to make suggestions in connection with a proposed amendment of the Co-operative Agricultural Production and Advances to Farmers Act, and the Council submitted concrete suggestions relative to the making available of advances for the purpose of purchasing pure bred stock.

Herd Book Societies.

Efforts have been made to secure the adoption of suitable rules by the various Herd Book Societies. Representatives of these societies have met representatives of the Council, and the question is still under review.

Herd Testing.

The Council is circulating, through Local Producers' Associations and other bodies, full information relating to herd testing and its advantages.

The methods adopted in the testing of herds by the Department of Agriculture and Stock have been approved, and Local Producers' Associations, in dairying districts, have been asked to promote herd testing on that basis. Two additional herd testers have been appointed by the Government, and farmers are now taking advantage of the opportunity to test the individual value of their milkers.

Fodder Conservation—Vital Necessity.

The Council recognises the necessity of fodder conservation, and has prepared a practical scheme.

Dairy Buildings.

At the request of the Council the Government has prepared plans of dairy buildings for distribution to producers. The Council has also approved of proposed amendments of the Regulations relating to size of buildings, and has secured modification in the prescribed drainage.

Milking Machines.

The Council requested the Department to take action to secure the cleanliness of milking machines, and the Department has given effect to the recommendation.

Cream Containers.

The Council has co-operated with the Queensland Co-operative Dairy Companies' Association in advocating the use, on dairy farms, of standard seamless containers protected by fly-proof gauze covers, and the various factories have co-operated in securing their general use.

Pasteurisation.

Information regarding pasteurisation of milk and cream has been collected from New Zealand and elsewhere, and the Council has advocated the installation of pasteurisers, where found necessary, in Queensland. The Co-operative Dairy Companies and Cheese Manufacturers' Associations have been asked to assist.

Co-ordination of Factories.

In the matter of the proposed erection of additional butter factories in districts where a factory was already in existence, the Council was able to effect an agreement between the parties concerned and to avoid duplication of plant and effort.

Uniform System of Accounts.

Recognising the necessity of a uniform system of accounts for dairymen and dairy factories, the Council employed a committee of experts to draw up a comprehensive system of accounts to comply with all the conditions required, and the Council has approved that copies of the report with full explanations be sent to all factories. The report is being printed, and will be circulated without delay.

Metropolitan Milk Supply.

The Council has conferred with the Metropolitan Milk Suppliers' Association in regard to the more economic means of distribution of milk, and has drawn up definite rules for the constitution of a milk pool for the metropolitan area. This scheme has been forwarded to the Government with a request that action be taken to create the pool.

Railway Transport.

As a result of the Council's representations the Commissioner for Railways decided to make an all-round reduction of 20 per cent. on the freight of dairy produce. The Council has further brought under the notice of the Railway Commissioner the need of improving the design and increasing the number of trucks suitable for the carriage of dairy produce, and of taking proper precautions for ensuring that such produce would not deteriorate in value through faulty transport arrangements. These matters have received satisfactory attention.

Stabilisation of Prices.

Various attempts have been made to induce the proprietary factories in Victoria to join a scheme for the stabilisation of prices of dairy produce throughout Australia. Delegates have been sent to Victoria, and during their visits to the Southern States were asked to make strong representations in favour of stabilisation. The proprietary factories have not yet consented to join the scheme, but the matter is still being advocated energetically.

Grading of Dairy Produce.

The present practice of dual grading of dairy produce by Federal and State officers is considered to be very unsatisfactory, and the Council has recommended that all dairy produce should be graded by State officials acting for and on behalf of the Federal Government. This decision has been forwarded to the Minister for Agriculture for discussion at the next conference of Ministers for Agriculture, to the Minister for Trade and Customs, and to the State Dairy Standardisation Committee, for discussion at the next meeting of the Federal Council.

Cold Storage.

Through the action of the Council of Agriculture, the construction of Cold Stores at Hamilton was expedited, and at the request of the Council the control of these cold stores has been vested in the Minister for Agriculture and Stock, and the installation of a butter worker has been approved.

Cheese.

The Minister for Agriculture and Stock has agreed that, in order to obviate injury in transit, all cheese intended for export be crated at the factories.

Representation has also been made to the Government with the object of securing to the Cheese Pool Board the effective control of the industry.

Pigs.

Applications from pig raisers have been made for stabilisation of prices in their industries, and several suggestions have been made in regard to marketing of pigs. The question of constituting a Pig Pool for certain districts is under consideration, and the Council is in communication with the Local Producers' Associations in those districts in reference to the formation of such a pool.

Agent-General's Reports.

The Agent-General has been asked to furnish complete reports on the conditions surrounding the handling, marketing, and distribution of Queensland dairy produce in London, and reports are now being regularly received.

Tariff.

The Tariff Board has been interviewed in reference to reducing the tariff on the import of dairying machinery, and with the object of increasing the import duty on dairy produce from New Zealand.

Additional Officers.

Through the efforts of the Council additional Dairy Instructors and Inspectors have been appointed for the benefit of the industry generally.

DEVELOPMENT OF THE WHEAT INDUSTRY.

The Council, in conjunction with the Department of Agriculture and Stock and the State Wheat Board, has formulated a scheme for the improvement of wheat-growers in Queensland.

The scheme provides for the purchase by the Wheat Board from the Department of Agriculture and Stock of a quantity of specially selected seed which will be grown under special conditions. Wheat so grown will be reserved for seed purposes.

A new list of recommended varieties has been drawn up, and these varieties have been allotted to certain districts where each will be planted on specific classes of soil.

The Council recommended that assistance be given to needy farmers in want of seed wheat for planting, and, as a result, the Department of Agriculture and Stock has arranged accordingly with the State Wheat Board.

MAIZE.

With the view of organising maizegrowers, the Department of Agriculture and Stock, on the recommendation of the Council, arranged to collect statistical and other information for the purpose of enabling the Council to prepare a concrete scheme for the betterment of the conditions of the maizegrowers generally. The returns received by the Department indicated that the growers were not at present unanimously in favour of a Maize Pool.

The duty on imported maize under the general tariff rate is 3s. per cental. Under the Tariff Agreement between South Africa and the Commonwealth, maize of South African origin is admitted into Australia at a duty of 1s. per cental. The question of increasing the duty on maize of South African origin is to be considered in connection with the new Reciprocal Tariff Agreements between that country and the Commonwealth.

The Council circulated amongst the Local Producers' Associations a statement on the maize question and the value of the crop to Queensland, and asked for an opinion on what lines the Council should act. The returns indicated a unanimous vote in favour of a higher import duty on South African maize. Representations were then made to the Tariff Board urging an increased tariff on South African maize. The Minister for Trade and Customs and the Queensland members of the Federal Parliament have been asked to give their support to the Council's request, and have promised their assistance.

POTATOES.

A supply of excellent potatoes has been secured from Western Australia. These have been distributed amongst potato growers in bags of 7 lb. for seed purposes, on the condition that such growers returned to the Council 14 lb. for each 7 lb. received.

COTTON.

The Department of Agriculture and Stock has agreed to appoint an Entomologist to investigate cotton pests.

The supply of packs for the current season's crop is also receiving the attention of the Council.

ARROWROOT.

A pool was instituted at the request of growers, and is now in operation.

POULTRY.

After fully considering the suggestion of a Poultrymen's Committee for the formation of an Egg Pool from the business viewpoint, the Council recommended the establishment of a pool.

FRUIT.

At the request of the Council, the Chief Instructor in Fruit Culture (Mr. J. M. Ward) was appointed to act as Deputy of the Director of Fruit Culture (Mr. A. H. Benson, M.R.A.C.), and to assist in supervision.

Definite action, in the interests of fruitgrowers, has been taken in respect to the following matters:—

Appointment of Deputy Director of Fruit Culture (Mr. J. M. Ward).

Establishment and development of experimental plots in suitable localities.

Hail insurance.

Increase of entomological staff.

Legislation standardising sprays.

Co-operation with the New South Wales Government respecting border breeding grounds for fruit fly and eradication of the pest.

Establishment of a Stanthorpe and District Research Fellowship at the Queensland University, with the primary object of discovering economical means of combating the fruit fly pest.

Appointment of an entomologist (Mr. Hubert Jarvis) to specialise on the fruit fly problem.

[The appointment of an Entomologist (Mr. John L. Froggatt, B.Sc.) to investigate the Banana Beetle Borer Pest had previously been made by the Department of Agriculture.]

Special entomological investigation of the Banana Bunchy Top Disease and the Citrus Orange Bug.

To cope with the recommendations of the Council, the Entomological Staff and Fruit Inspectorial Staff have been largely increased.

Engagement of competent seasonal instructors in picking, grading, and packing.

Legislation for compulsory grading.

Amendment of the Fruit Cases Act.

Arrangements for supply of suitable case timber.

Experiments and inquiry relative to the utilisation of surplus fruits, and manufacture of by-products.

Consultation with Federal Authorities in respect to standard sizes of fruit containers.

Improvement of railway transport facilities.

Expedition of Queensland fruit consignments by rail and sea to Southern and Western markets.

Collection of reliable statistics.

Institution of the Tomato Pool at Stanthorpe at the request of growers.

Investigation and testing of systems of storage.

The carrying out of publicity campaigns which led largely to increased consumption of fruit.

Preliminaries towards more efficient marketing and distribution organisation.

THE SUGAR INDUSTRY.

Government and Council action in relation to the sugar industry has already been fully covered by the Journal, and a complete report of the proceedings of the delegation to Melbourne is set out elsewhere in this issue.

FERTILISERS.

The question of the supply, prices, and standard grades of fertilisers is under consideration in all its bearings. Official information on the elements of chemistry for the farm, dairy, and household has been disseminated by the Department of Agriculture and Stock.

WATER SUPPLY.

Water supply schemes have been prepared.

POOLS.

Legislation governing the formation of pools for farm produce.

SOLDIER SETTLEMENTS.

As the result of representations made by the Council, the Government came to the assistance of the soldier settlers at Pikedale, and agreed to make available to them amounts of £20 per acre to enable them to clear their blocks to the extent of 10 acres.

RURAL CREDIT SYSTEM.

A comprehensive scheme for the establishment of a rural credit system has been evolved, and is now receiving the consideration of a special committee of the Council.

CO-OPERATIVE COMPANIES.

The introduction of legislation to deal with the formation and activities of co-operative companies has been under consideration, and a scheme in this connection has also been evolved. This is now under consideration by the Administrative Committee of the Council.

TAXATION OF FODDER.

The Council has given consideration to the matter of the taxation of fodder, and, in view of its efforts to encourage conservation, has passed and conveyed to the proper authorities the following resolution:—

> "That in view of the particulars regarding the taxation of fodder furnished in recent letters from several branches of the Queensland Producers' Association, and moreover, as the Council is now actively engaged in urging farmers to conserve fodder, it is recommended to the State and Federal Income Tax Commissioners that where fodder is stacked on a farm it be not subject to income tax until it has either been sold or converted into cash through feeding to stock."

CONCLUSION.

The Queensland Primary Producers' Organisation scheme is probably one of the finest that has ever been brought into being in any country for the betterment of the man on the land, and it is gratifying to know that the farmers are so generally realising its potentialities and their responsibilities. The power for good of this organisation is limited only by the extent to which the producers of Queensland are willing to support and make use of it, and the extent to which they are prepared in the due spirit of co-operation to help each other by means of the scheme.

Science Notes.

By EDMUND JARVIS, Entomologist, Bureau of Sugar Experiment Stations.

ON THE HABITS AND COLOURATION OF QUEENSLAND RUTELLIDÆ.

The beetles figured on the accompanying plate include two or three of our most beautiful species of *Coleoptera*.

My feelings of admiration for the so-called "gold-beetle" (Fig. 3) were first awakened about thirty-two years ago, in Victoria, by Mr. Charles French, F.L.S., who showed me a fine series of fifty or more pinned specimens.

This insect has a very artificial appearance, seeming, at first glance, to be made literally of polished metal.

It was, perhaps, just such a beetle that Edgar Allan Poe had in mind when penning that familiar tale of mystery entitled, "The Gold Bug."

A closely related, but slightly larger cockchafer (*A. mastersi* Macl.), of a lovely metallic greenish-gold colour is considered by growers at Macknade and Ingham to be a pest of sugar-cane.

The grubs of *Anoplognathus frenchi*, however, subsist on the roots of various native plants, but although of little or no economic interest at present may possibly be found, later on, to attack cane in those localities where the insect is known to occur freely.

The beetles are reported to feed on the foliage of a wild *Hibiscus* with large yellow flowers, that usually grows in wet situations, and is a common tree close to Cairns and at Freshwater.

In the Herbert River district it is called "Cotton-tree," and said to be a favourite food-plant of our grey-back beetle.

It may interest readers to know that the bright colours of Rutellidæ and of many other coleoptera possessing brilliant shades of blue, green, violet, &c., are due in part to the surface of the elytra or wing-cases being formed of innumerable microscopical concavities or wrinkles. In *A. punctulatus* and *smaragdinus* (figs. 4 and 6) each of these countless punctures is surrounded by striæ, and forms the centre of a four to six-sided figure.

In the case of *frenchi* the colour appears to be of a chemico-physical nature, being due to diffraction of the rays of light falling on such surface irregularities, combined with an underlying reflecting pigment. Thus, if a specimen be left for a month or two in alcohol or formalin this pigment is destroyed, the beetle becoming of a uniform light-brown colour; whereas, if killed and dried without delay the golden splendour of the insect is permanently retained, owing to this underlying pigment, which is secreted by the hypodermal cells, being enclosed in air-tight sacs.

Anomala Australasiæ, Blackb. (Fig. 1).

The egg and early larval stages of this species—not hitherto published in our bulletins—were worked out by the writer during 1918-19, and are of scientific interest.

A beetle captured 28th November, and confined at once in a breeding-cage, was found when examined nine days later to have laid 18 eggs. These varied in size, so were probably deposited on different days. They hatched on 17th December (nineteen days after capture of the beetle); and a couple of months later (17th February) several third-stage grubs were found.

Other beetles caged on 5th December produced eggs six days later, which hatched on 20th December (fifteen days after capture of beetles).

By about the middle of April nearly all the grubs bred during the course of these investigations had moulted into stage three, and early in May were commencing to pupate.

Description of Egg.—Nearly spherical, smooth, milky-white, and measuring 2.25 mm. longest axis; ten eggs in a straight line, touching end to end, = 22.50 mm. These eggs are laid separately in the soil, no chamber or enlargement being made to allow for swelling.

Description of Newly Hatched Larva, before Feeding.—Dirty white, yellowish-brown towards and on anal-segment. Head, legs, and antennæ light-yellow, trophi reddish-brown. Body sprinkled with golden hairs. When inactive, assumes a doubled-up posture, ball-like in form, but is able to stretch to fullest length and crawl quickly on its venter. A day or two after hatching the body darkens to bluish-brown.

Description of First Larval Instar.—General colour bluish-grey; head pale fulvous, width of same 2.70 mm. Length, doubled-up position, 9 mm., length fully extended, 16 mm. Legs whitish-yellow. Disposition of body hairs, very similar to stages two and three. Anal path on posterior ventral surface, distinct, and defined by short setæ.

Description of Second Larval Instar.—General colouration pale bluish-yellow, somewhat shining. Head, legs, and spiracles fulvous; mandibles and labrum castaneous, the former darker towards tips; width of head 4 mm. Peritremes very open, and with exception of first thoracic equi-sized. Body clothed with reddish-brown hairs, rather long, and sparingly distributed on thoracic and first abdominal segments. Posterior area of venter of anal segment with numerous short, recurved, scattered hairs, and exceptionally with no indication of an anal path. Length, in doubled-up position 15.50 mm. *Note.*—When lying on its side in this position the grub assumes an almost circular form. Length, when fully extended 28 mm.; widest transverse measurement 7.50 mm.

The colour of this beetle is dark bronze-green, more or less clouded in certain lights with lustrous shades of pink.

It was first recorded as being a cane pest by the writer in Bulletin No. 3 of this Experiment Station, 1916, p. 40.

Repsimus Æneus, Fabr. (Fig. 2).

The general ground colour of this beautiful beetle is chrome-green, most specimens, however, being flushed with coppery or steely-blue tints, while the reflected high lights appear a lovely pale golden-green.

It may be identified immediately by the structure of its hind legs, which are longer and noticeably thicker than the others.

The writer observed several of these insects in January, 1915, flying around a stunted eucalpt on the sides of Mount Pyramid.

One of them had been attacked and killed by a pentatomid bug (*Amyotea hamata Walk.*) which was seen resting on a gum-leaf supporting the weight of the beetle in mid air at the end of its proboscis, while engaged in sucking the juices of the victim.

According to Froggatt, these beetles are common about Sydney, where they are found clinging to low bushes.

Anoplognathus Punctulatus, Oliff., and A. Smaragdinus, Ohaus. (Figs. 4, 6).

These two insects, as seen by the plate, differ noticeably in form, and although both of a rich uniform green—an almost pure oxide of chromium—the shade of colour in *smaragdinus* is lightened with more yellow, producing a lustrous effect not present in *punctulatus*.

The pygidium, and under surface of the latter insect, including the legs, is dark coppery-brown with light greenish-gold reflections; while *smaragdinus* is green below, with lighter golden-brown legs, and its pygidium is the same colour as the elytra.

Neither of these beetles are known to be of economic importance, or have, up to the present, been recorded from canefields.

Anoplostethus Laetus, R. & J. (Figs. 7, 8, 9).

This species, which is one of our most lovely beetles, is remarkable in possessing distinct varieties, three of which are shown in figs. 7, 8, and 9.

The green specimens are reported to be about four times as plentiful as the other varieties, which usually occur in about equal proportions. Change of colour in perfectly developed insects is believed by Krukenberg to result from change of food, and can be explained by alteration of the pigment through heat and light. Such alteration, however, is generally effected gradually, so would scarcely apply in the present instance, unless on the supposition that an interval of a week or more may elapse between the appearance of early specimens and those constituting a larger and later emergence.

The colour in this species is evidently of a less enduring quality than those characterising the beetles already alluded to.

The beautiful glossy alizarin-green variety does not fade appreciably in dried specimens, whereas the red form, the colour of which in life resembles that shown in fig. 8, changes to brown-madder, and the pinkish opalescent violet variety darkens to a warm monochrome after death. In a fourth and much rarer orange-yellow variety of this beetle the colour appears to be of a still more fugitive nature.

A second species of this genus, *A. opalinus,* is recorded by Froggatt as being of a beautiful pale opaline-green colour, and peculiar to Western Australia.

"Christmas Beetle" (Anoplognathus Boisduvali, Boisd.), Fig. 5.

This insect was mentioned by the writer in 1915 (Bull. No. 3, p. 40) as occurring commonly among cane roots in both light and heavy classes of soil, but showing a preference for sandy loams.

Its favourite food-plant appears to be Eucalyptus platyphylla, a tree with white, smooth bark, and having, as denoted by its specific title, very broad leaves. It is not uncommon to find suckers springing from stumps of this gum-tree with leaves eight to ten inches in length and six to eight in width.

The general colouration of this beetle when alive is pale creamy-grey, with a distinct silvery lustre and faint green and pink iridescence. The silvery sheen, however, fades after death, being replaced by pink-ochraceous, as indicated in fig. 5, drawn from a dried specimen. Each elytron has about ten rows of coarse punctures, half of which are straight and clouded in places with smoky-brown, all ten rows enclosing numerous smaller brown punctures. The suture is green, while the outer edges of elytra are bordered with golden-brown. Head, prothorax, and scutellum metallic greenish-gold, finely punctulate. Pygidium bright green edged with blue. Ventral area irridescent coppery-green; thorax, legs, and anterior margins of abdominal segments more or less clothed with short white hairs. Tibiæ and tarsi purple.

This species ranks about third in economic importance amongst our beetles attacking sugar-cane.

PLATE NO. 85.

DESCRIPTION OF PLATE.

SOME NORTH QUEENSLAND RUTELLIDÆ; INCLUDING BEETLES WHICH ATTACK SUGAR CANE (All figures life-size).

Fig. 1. *Anomala australasiæ* Blackb.

Fig. 2. *Repsimus æneus* Fabr.

Fig. 3. *Anoplognathus frenchi.*

Fig. 4. *Anoplognathus punctulatus* Oll.

Fig. 5. *Anoplognathus boisduvali* Boisd.

Fig. 6. *Anoplognathus smaragdinus* Ohaus.

Figs. 7, 8, 9. *Anoplostethus lætus* R. & J. (three varieties).

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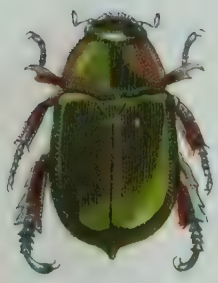

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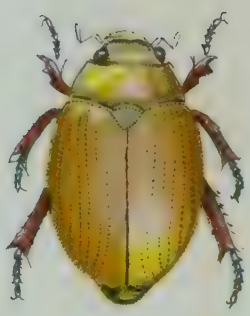

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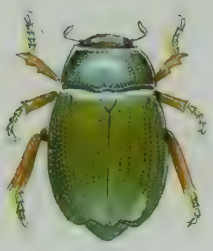

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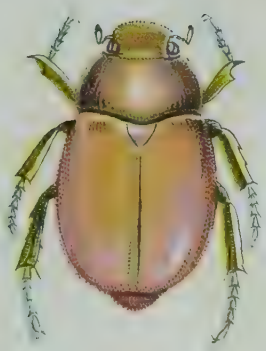

9

TREATMENT FOR SMALL WORMS IN HORSES

(SCLEROSTOMA TETRACANTHUM).

This is a small thread-like worm, about half an inch long, found chiefly in the large bowel in great numbers. The embryos encyst themselves beneath the mucous membrane. The countless wounds which the worms make in the bowel and the irritation caused by the encysted larvæ give rise to enteritis, &c. There is usually associated with this worm another known as the *Sclerostoma equinum*. This worm is about 1¼ inch to 1½ inch long, grey or reddish-grey in colour, with a round knobbish head, and tapering to the tail end. The embryos wander into the blood vessels, causing obstructions giving rise to grave complications.

Treatment.—All suspected animals should be purged by administering a dose of physic, such as 5 to 6 drachms of Powdered Barbados Aloes with one drachm of Powdered Ginger, given as a drench in a pint of thin gruel, or made into a ball with a little soft soap. After the action of the purgative has ceased they should be given every day, about one hour before their morning feed, the following powder mixed in a couple of handfulls of damped food:—

Antimony Tartrate	2 drachms
Powdered Sulphate of Iron	1 drachm
Powdered Gentian	2 drachms
Powdered Aniseed	3 drachms

After six doses they should be given a second active purgative. For the smaller horses and ponies not more than 5 drachms of Aloes and 1 drachm Antimony Tartrate should be given. During the treatment the animals should be kept yarded to prevent the contamination of pastures by excreta, which should be gathered up and burnt and the ground dressed with common salt or quicklime. As infested animals cannot by one course of vermifuges be divested of the larvæ in the cysts and blood vessels, they should be treated at intervals of two or three months. More important than medication is the exclusion of embryos from food and water.

Wherever the Sclerostoma have secured a local habitat the land should be put under a rotation of crops, to be laid down in grass again after four or five years; the Sclerostoma ova will by this time have hatched out and died a natural death. Where this is impracticable change the horses to other pastures and depasture the infested land for several years by cattle or sheep, which do not harbour the Sclerostoma. In all cases it must be provided that no drainage can come from infested pastures to the clean pastures. Rock salt left in the paddocks for the horses to lick will greatly minimise the chances of infestation.—Major A. H. Cory, M.R.C.V.S.

THE COTTON BEETLE—A GROWER'S EXPERIENCE.

Mr. T. Winterton, of Lismore, New South Wales, regards the beetle that attacks the cotton plant as a minor pest, seeing that it can be easily and effectively dealt with (reports the Sydney "Daily Telegraph"). His half-acre crop looked very promising three weeks ago, when the plants were attacked by swarms of beetles. He tried dusting with lime, and arsenate of lead spray. "These," he says, "seemed to act like sauce for them, and it looked as if they would eat up everything except the stalks. I then got an old broom handle, bound a big wad of woollen cloth round the end with wire, and soaked it with kerosene. When it was dark I lighted it, and, walking slowly through the cotton, taking two rows at a time, I shook the plants. The beetles flew in myriads to the light, and fell in heaps with their wings and legs burnt. Next morning one could pick them up in handfuls in places. I went over the field again the next night, and destroyed nearly all of them. A few days after I gave them another run through, but only found one here and there, and now they are quite free. If I had known this method at the start they could all have been settled the first night, and great damage prevented. It took me about one and a-half hours to go over half an acre."

Mr. Winterton adds: It may interest your readers to know I picked some cotton to-day from plants the seed of which was planted on 6th October, or not quite four months' growing. I noticed the beetles attacked the most forward cotton first; that planted last, which was only small, was scarcely touched.

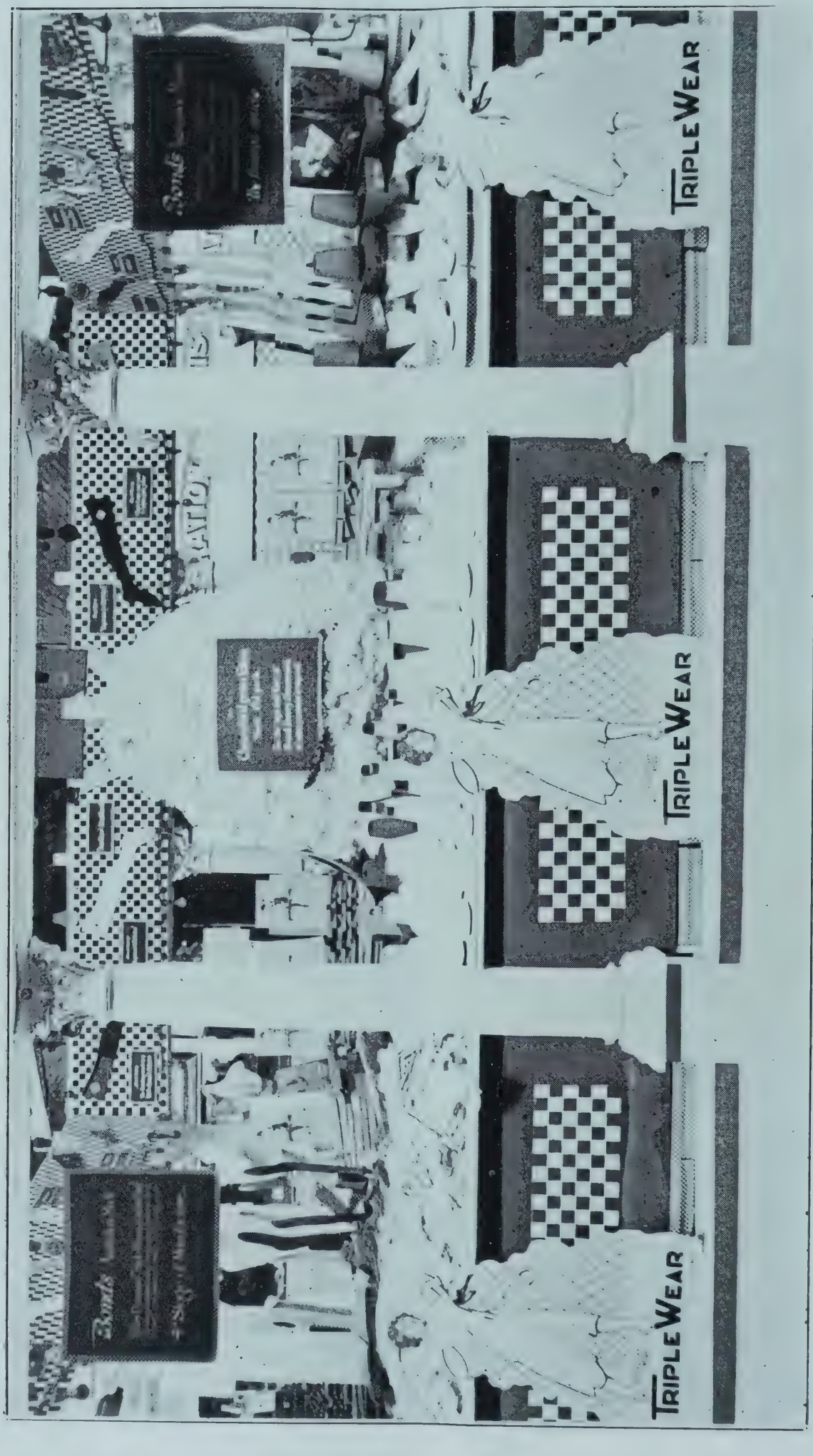

PLATE 86.—AUSTRALIAN NATIVES' ASSOCIATION EXHIBITION, MELBOURNE, 1923.

SHOW DATES FOR 1923.

Herberton, 2nd and 3rd April.
Pittsworth, 4th April.
Chinchilla, 10th and 11th April.
Goondiwindi, 10th and 11th April.
Oakey, 11th and 12th April.
Toowoomba, 17th to 19th April.
Kingaroy, 26th and 27th April.
Maleny, 26th and 27th April.
Miriam Vale, 26th and 27th April.
Blackall, 9th and 10th May.
Boonah, 9th and 10th May.
Taroom, 1st and 2nd May.
Charleville, 1st and 2nd May.
Dalby, 2nd and 3rd May.
Nanango, 3rd and 4th May.
Atherton, 16th and 17th May.
Wondai, 9th and 10th May.
Roma, 15th and 16th May.
Emerald, 16th and 17th May.
Murgon, 17th and 18th May.
Wallumbilla, 22nd and 23rd May.
Hughenden, 22nd and 23rd May.
Ipswich, 23rd and 24th May.
Kilkivan, 23rd and 24th May.
Springsure, 23rd and 24th May.
Childers, 24th and 25th May.
Beaudesert, 29th and 30th May.
Maryborough, 29th, 30th, and 31st May, and 1st June.
Buderim, 1st and 2nd June.
Bundaberg, 1st and 4th June.
Marburg, 2nd and 4th June.
Mackay, 4th and 7th June.
Esk, 6th and 7th June.
Cairns, 6th and 7th June.
Gin Gin, 6th to 8th June.
Gladstone, 12th and 13th June.
Gayndah, 12th and 14th June.
Toogoolawah, 13th and 14th June.
Mundubbera, 13th and 15th June.
Mount Larcom, 15th and 16th June.
Biggenden, 20th and 21st June.
Rockhampton, 21st to 23rd June.
Lowood, 22nd and 23rd June.
Kilcoy, 28th and 29th June.
Ithaca, 29th and 30th June.
Bowen, 4th and 5th July.
Gatton, 11th and 12th July.
Charters Towers, 11th and 12th July
Woodford, 12th and 13th July.
Wellington Point, 14th July.
Townsville, 18th and 19th July.
Caboolture, 19th and 20th July.
Mount Gravatt, 21st July.
Barcaldine, 24th and 25th July.
Nambour, 25th and 26th July.
Rosewood, 25th and 26th July.
Maroochy, 25th and 26th July.
Pine Rivers, 27th and 28th July.
Crow's Nest, 31st July and 1st August.
Sandgate, 3rd and 4th August.
Brisbane Royal National, 6th to 11th August.
Belmont, 18th August.
Charters Towers, 22nd and 23rd August.
Coorparoo, 25th August.
Gympie, 29th and 30th August.
Wynnum, 31st August and 1st September.
Imbil, 5th and 6th September.
Zillmere, 8th September.
Laidley, 13th and 14th September.
Beenleigh, 20th and 21st September.
Ingham, 21st and 22nd September.
Rocklea, 22nd September.
Toombul, 28th and 29th September.
Kenilworth, 4th October.
Esk Bushmen's Carnival, 17th and 18th October.
Nerang, 19th October.
Ascot, 24th October.
Malanda, 25th and 26th October.
Pomona, 21st and 22nd November.
Millaa Millaa, 23rd and 24th November.

TREATMENT FOR MANGE IN HORSES.

The affected parts should be well washed with warm water and soda. After the animal is dry, the following dressing should be applied once daily for three days:—

Sulphur	4 ounces
Creolin	4 drachms
Linseed oil	1 pint

Allow the dressing to remain on for three days after the last application, then thoroughly wash off and repeat dressing after an interval of a week.—Major A. H. Cory, M.R.C.V.S.

Photo.: A. Blakey, Junr.]

PLATE 87.—OVER BAROON POCKET, NEAR MONTVILLE.

Photo.: A. Blakey, Junr.]

PLATE 88.—ON THE ROAD FROM BUDERIM TO THE SEA.

General Notes.

To Correspondents.

Correspondents seeking information through the Journal should address all communications to the Under Secretary, Department of Agriculture and Stock, Brisbane. Letters on official matters should not be addressed personally to the Editor, who may be away from Headquarters on official duty at the time of their delivery. To ensure prompt acknowledgment all technical inquiries should be directed, as suggested, to the Under Secretary.

To Subscribers.

In future the cross indicating the expiry of the term covered by subscriptions will be placed in the space delineated on the first page of the Journal. It is suggested that when remitting subscriptions, farmer subscribers should send, say, anything up to five years' subscription (5s. to cover postage). This would simplify the work of forwarding, save time and expense of renewing stencilled mailing lists, and ensure continuity of despatch. It so often happens that when a subscriber's term expires the non-receipt of the Journal is the only reminder that his subscription is no longer current. In the meantime his name has been removed from the mailing list. When the renewal, the only evidence of a subscriber's desire to continue, is received, a fresh stencil has to be cut, and as this costs something over 1d. the expense in the aggregate is considerable. The Journal, of course, is free to farmers, and the annual charge of one shilling merely covers cost of postage.

Pools—Victorian Farmers Looking to Queensland.

A deputation of Victorian onion growers last week urged the Government to form a compulsory pool to take over the unsold balance of the crop. The growers said the cost of production was £6 per ton, including labour, and many of them were receiving only £2 5s. per ton. It was suggested that the pool should fix the selling price at £7 per ton, growers to be allowed £3 at once and £4 held in hand for expenses and reserves. The Minister for Agriculture (Victoria) said that a pool was out of the question, as it was against the policy of his Government. He advised the formation of a growers' association, and a voluntary pool. The Victorian producers are not yet educated up to the benefits of the pool system—which is merely co-operative marketing —and there is little or no recognition of the right of the man on the land to get a paying price for his products. The Queensland Butter Pool has been most bitterly attacked in Melbourne by men who were disappointed at not getting our butter at their own price, and also by honest theorists who believe that producers should muddle along in the bad old way. The dairy farmers in Victoria are asking why they have no organisation such as the Queensland farmers have, and the onion growers will have to do some hard thinking also. In Queensland the primary producers are quickly getting out of the method of throwing their stuff on to the market, and letting it take its chance, and it probably will surprise Victorians to know that produce merchants are giving very cordial support to the new system.—"The Queenslander."

Anniversary of a Notable Agricultural Advance—A Milbong Celebration.

Messrs. S. Gordon (Secretary) and D. J. Casey (Chairman), of the Milbong Local Producers' Association, write under date 26th March:—

"To the Minister for Agriculture and Stock, Hon. W. N. Gillies.

"At a commemorative social and banquet held at Milbong on the 23rd instant, at which were represented various officials of other branches of the Producers' Association, and before a large and representative gathering of farmers, the following resolution was read and carried amidst acclamation:—

"We, farmers of Milbong and adjacent districts, meeting to celebrate the first anniversary of the birth of the Queensland Producers' Association, desire to express our gratitude to the Premier of the State and to the Minister for Agriculture for the creation of the Queensland Producers' Association, and to the Queensland Government for placing upon the statutes the Primary Producers' Organisation Act and other measures of inestimable benefit to producers.

"As evidence of our gratitude we celebrate this occasion, hoping thereby that it may stimulate a greater interest in our movement and demonstrate our appreciation of the Government's efforts to place our industry on a more remunerative plane."

Australia as a Market for Manufactured Cotton Goods.

The export of cotton manufactures from the United Kingdom during January last amounted to 339,117,400 square yards of material, of which Australia received 22,030,300 square yards. Two other countries only exceeded that quantity, China (including Hong Kong) received thirty-five and a-half million square yards; and India (excluding Burmah) eighty-one million square yards.

Protection of Native Bears and Opossums.

A Proclamation has been issued under "*The Animals and Birds Act of* 1921," the effect of which is that there will be no open season for opossums and native bears this year.

Standing Committees, Council of Agriculture.

In accordance with the provisions of "*The Primary Producers' Organisation Act of* 1922," the following Standing Committees of the Council of Agriculture have been formed:—

Administrative.—Messrs. G. H. Pritchard, J. D. Story, E. Graham, W. Ranger, W. J. Short, J. W. Davidson, and G. Burton.

Publicity.—Messrs. G. H. Pritchard, J. D. Story, E. Graham, W. Ranger, W. J. Short, J. W. Davidson, and G. Burton. Associate Member—Mr. J. F. F. Reid.

Dairying.—Messrs. A. Evans, E. Graham, J. Hardcastle, T. F. Plunkett, R. Swan, J. T. Tatnell, and J. T. Tod.

Fruit.—Messrs. W. Biggs, T. H. Brown, W. Ranger, F. M. Ruskin, and C. Bateman.

Sugar.—Messrs. W. G. Batchler, W. Biggs, T. A. Powell, G. H. Pritchard, and W. J. Short.

Transport.—Messrs. W. G. Batchler, J. W. Davidson, A. Evans, A. McKinlay, W. Ranger, J. H. Sigley, and R. Swan.

General Agriculture.—Messrs. C. Bateman, R. K. Boyd, G. Burton, T. C. Hayes, A. McKinlay, H. C. Quodling, and J. H. Sigley.

The American Boll Weevil—Arsenic Preventive.

The National Bank of Commerce in New York, in its "Commerce Monthly," deals with the question of fighting the Mexican cotton boll weevil by the use of calcium arsenate. The paper says that 97 per cent. of the United States cotton belt is infested, and the demand for the calcium arsenate bids fair to outrun the available supply of arsenic. Further, it is said that experiments conducted by the United States Department of Agriculture and by independent agencies in recent years indicate that the most effective means of combating the weevil so far developed is the use of calcium arsenate, which is dusted upon the cotton plant at night. The dew becomes impregnated with arsenic, and the weevils are poisoned by drinking it. Calcium arsenate, it is said, was first used to poison the boll weevil in 1919, and now about 10 per cent. of the cotton acreage is treated. Because of the success of experiments so far made, a much more extensive application is planned for 1923. The amount of calcium arsenate required varies according to conditions, but 30 lb. per acre may be taken as a moderate allowance. This is distributed in a series of applications. The total cotton acreage in 1922 was 33,742,000 acres, so that if applications could be made on all fields 500,000 tons of calcium arsenate would be required, containing approximately 200,000 tons of white arsenic. Areas of marginal production in many cases would scarcely support the cost of application, while everywhere the specific used will at best fall far short of this quantity. Conditions for successful application are exacting, and in many the psychological factor of inertia must be reckoned with. But when all these deductions have been made, it is evident that there is a large potential demand for calcium arsenate to combat the boll weevil. The amount actually used will depend upon the available supply and the price in relation to the price of cotton. United States output of white arsenic, the form in which practically all primary arsenic is recovered in this country, and which is the basis for the manufacture of other compounds, increased from 3,141 tons in 1912, the year of largest pre-war output, to 11,502 tons in 1920, and production in 1922 fell only a little short of 11,000 tons. Consumption in 1920 was estimated at 14,000 to 16,000 tons, imports supplying 3,740 tons, and present demand is believed to be about 12,000 tons. While the United States is the largest producer of arsenic, it is also the largest consumer, and at no time has domestic output been sufficient to satisfy domestic requirements.

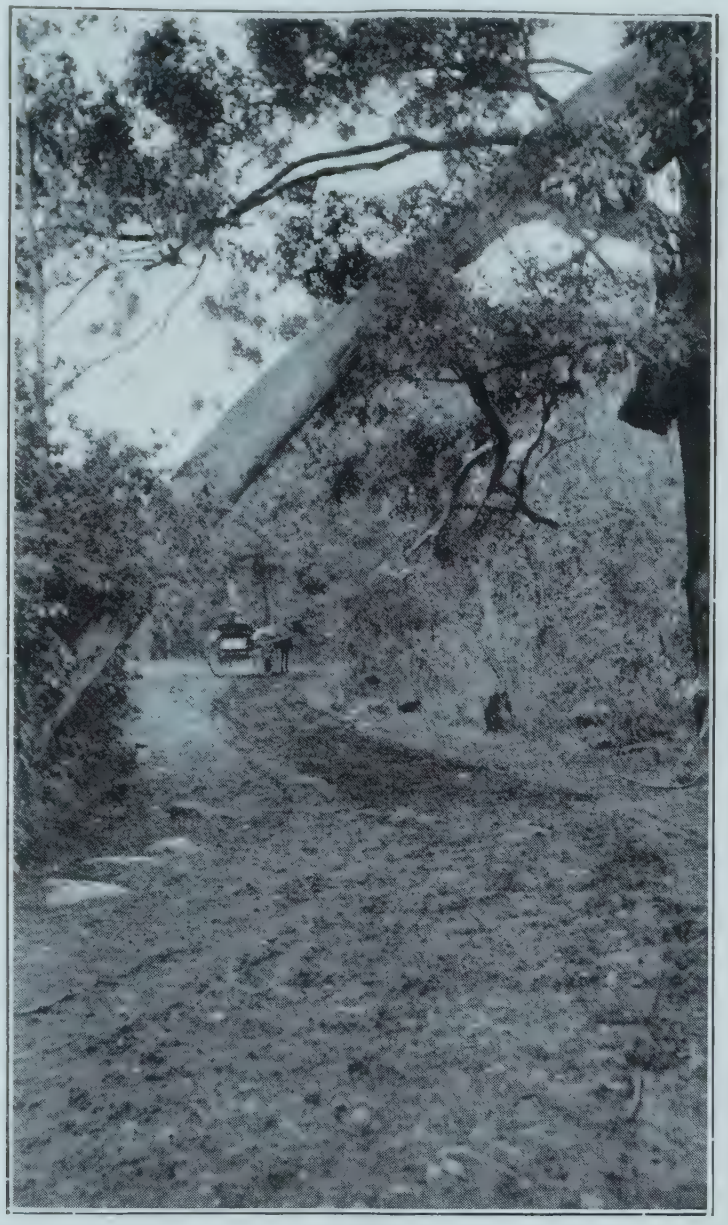

Photo. : A. Blakey, Junr.]

PLATE 89.—ON THE ROAD TO THE SEA FROM BUDERIM MOUNTAIN.

Photo. : A. Blakey, Junr.]

PLATE 90.—A MONTVILLE ORCHARD.

American Cotton Conditions.

Information received from America by Mr. W. G. Wells (Cotton Adviser, Department of Agriculture and Stock) goes to show that there is a wide range of opinion among traders and crop experts in that country as to the immediate course of prices for cotton, but the latter group have indicated a firm belief in higher figures being ultimately obtained. Crop prospects in the south of America, it is stated, were not growing any brighter, and it was more than doubtful whether the cotton States would be able, in 1923, to expand their output. A labour supply inadequate to cultivate the acreage which planters hope to sow with cotton this year seems inevitable. There had been a lack of rain in some parts where it was badly needed, and in certain localities the winter weather has been such as to make the boll weevil an even greater menace than in the past. This danger had been augmented by the shortage of efficacious insecticides. It was regarded as significant that English spinners were buying cotton from the United States as fast as they could accumulate the raw staple at present prices. This policy was determined upon shortly after France entered the Ruhr, and the acceptance of the American terms for the payment of the British debt to the United States had confirmed the spinners in their attitude. They were taking steps to maintain themselves in the cotton cloth markets of the world throughout the coming year by providing for the future requirements as far as possible. On 1st February one of the foremost cotton experts of the southern part of America predicted a price of 35 cents per lb. of cotton (roughly 1s. 5½d.) before the new American crop came on the market at the end of their summer. He also declared that the mills would have to scurry round for raw cotton in a manner not known since 1910 in order to keep their spindles at work.

Departmental Appointments.

Constable Blake has been appointed an inspector of slaughter-houses.

D. J. Binnie, the supervisor of the Cecil Plains Soldier Settlement, has been appointed an Acting Inspector of Stock.

William Rowlands, fruit packing instructor, has been made an inspector under the Diseases in Plants Act.

To Queensland Cotton-growers.

Growers, until further advised, must rail their cotton as under:—From all stations south of Ambrose (N. C. Line), excepting stations from Lakeside westwards on the Mundubbera Branch and from Blaxland westwards on the Western Line, to Whinstanes. Cotton from North Queensland to be shipped to Brisbane; from all stations west of Blaxland on the Western Line and Branch lines to Dalby; from all stations on the Gayndah-Mundubbera Branch west of Lakeside to Gayndah; from all stations between Ambrose (N. C. Line), inclusive, and Mackay, including stations on the Central Line and Branches, but not including stations on the Dawson Valley Branch (Mount Morgan-Baralaba), to Glenmore (Rockhampton); from all stations on the Dawson Valley Branch (Mount Morgan-Baralaba), to Wowan.

Marks.—Growers should brand all packages with their full name.

Advices from Growers.—It is most important that growers, when forwarding cotton, *send an advice to the ginnery to which their cotton has been consigned.* If growers consign cotton and fail to advise the ginnery, *payment will be delayed.* Therefore, always advise the ginnery when forwarding cotton, and post the advice so that it will reach the ginnery before or at the same time as the cotton.

Ratoon Cotton.—Packages containing ratoon cotton must be branded in 2-inch letters—"Ratoon." Ratoon cotton will only be received at Rockhampton and Whinstanes Ginneries, and growers are requested to rail as under:—

From all stations south of Ambrose (N. C. Line) to Whinstanes; from all stations north of Ambrose (N. C. Line) to Rockhampton (Quay street).

Photo.: A. Blakey, Junr.]

PLATE 91.—THE COAST ROAD, BUDERIM.

Photo.: A. Blakey, Junr.]

PLATE 92.—TYPICAL NORTH COAST DAIRY LANDS, BELOW BLACKALL RANGE, NEAR MONTVILLE.

America Interested in Queensland Agricultural Organisation—The Need for Marketing Machinery—A Minnesota View.

Mr. J. H. Hay, Deputy Commissioner, Department of Agriculture, State of Minnesota, writing from the State Capitol, Saint Paul, under date 22nd January, 1923, says:—

"I beg to acknowledge receipt of your kind favour of 14th December, also a number of buiietins and other agricultural information, under separate cover.

"All of this material is of decided value at this time. I refer to the fact that the farmers of the United States are giving serious consideration to the organisation of efficient marketing machinery through which to move their commodities to market. No little interest prevails in our State and in neighbouring States, with reference to the experiences of Australia and New Zealand in the matter of the marketing of their grain. There have been built up in our country strong organisations of middlemen who take heavy toll of the grain farmer. These organisations are exceedingly efficient, have large financial interests which support them, and have secured a tremendous hold upon the control of the marketing processes. In fact, they have exclusive control of the domestic and foreign marketing of the grains of this country. It is the purpose and determination of the farmers of the United States finally to secure control of their own marketing processes, and in addition an ample amount of finance with which to hold and move the crop to mills and export.

"I desire to express my pleasure and gratitude for the kindness you have exhibited in so promptly forwarding to me the information indicated above. We should be pleased to be placed on your mailing list for other agricultural information which your Department may issue in the future. I assure you that it will be our pleasure to reciprocate in any manner which you may indicate to us."

American Appreciation.

Mr. Hugh P. Baker, F.R.G.S., of the American Paper and Pulp Association, New York City, writes:—

"The 'Queensland Agricultural Journal' is being received regularly, and is very much appreciated. While my chief interest as a forester is in the forest situation in Queensland, yet, having been connected with several of our Agricultural Colleges in this country, I am very much interested in other matter in the Journal.

"Attached to this letter I am sending several of our recent Press Bulletins on the forest conditions in this country. Some of this matter may be of interest to you.

"If at any time we can give you information as to forest conditions in this country I wish you would feel free to come at us."

South African Farmers Seek Information on the Queensland Scheme for Complete Agricultural Organisation.

The Executive of the Transvaal Agricultural Union (Transvaalse Landbouw Unie), Pretoria, writes:—

"A copy of your 'Agricultural Journal' for August, 1922, has fallen into our hands, and we are much interested to note from page 5 and the accompanying diagram that your agricultural industry is organising on almost similar lines to the Transvaal Agricultural Union.

"Whilst our Union, however, is entirely self-supporting, your organisation would appear to be under Government control, or at any rate support and reorganised by your Government.

"Our interest is so great that we would esteem it a great favour if you could send us the fullest particulars of your scheme:—Constitutional, propaganda, membership, finances, &c.

"Another point of interest to us is your method of handling Crop Reports.

"Then, your notes on your 'Primary Producers' Organisation Bill' and 'Agricultural Education Bill' have caught our eye, and we would be pleased to have copies of the Bills. In fact, any information or publications you can send us will be appreciated.

"We have recently started our own official organ, 'The Farmers' Gazette,' a copy of which will be sent to you regularly, and in the course of the next mail we hope to send you a photo. of our organisation diagram.

"A copy of our amended Constitution is enclosed herewith."

Mill Offals—An Alleged Anomaly.

A deputation representing the Warwick Farmers' Milling Company was introduced to the Minister for Agriculture (Hon. W. N. Gillies) recently by Mr. F. T. Brennan, M.L.A. The deputation consisted of Messrs. Hooper and Kirkegaard, two of the Directors of the Warwick Farmers' Milling Company. The deputation explained to the Minister the existence of a certain anomaly regarding rebate on bran and pollard, and stated that the Wheat Board had not seen its way to meet them in their request. The Minister pointed out that he thought the deputation might again interview the Wheat Board, and he asked Mr. Brennan to represent him at such an interview. Messrs. Hooper and Kirkegaard agreed to the suggestion.

Council of Agriculture.

The new Council of Agriculture (as from 23rd March, 1923, to 30th June, 1924) has been constituted as follows:—Hon. W. N. Gillies, Minister for Agriculture and Stock, President; Messrs. J. W. Davidson (Commissioner for Railways), E. Graham (Director of Dairying), H. C. Quodling (Director of Agriculture), W. J. J. Short (General Manager, Bureau of Central Sugar Mills), and J. D. Story (Public Service Commissioner). Representatives of district councils of agriculture (districts as per Order in Council of 21st December, 1922): No. 1, Mr. G. H. Pritchard; No. 2, Mr. W. B. Biggs; No. 3, Mr. T. A. Powell; No. 4, Mr. A. Evans; No. 5, Mr. W. G. Batchler; No. 6, Mr. R. L. Boyd; No. 7, Mr. J. T. Tatnell; No. 8, Mr. J. H. Sigley; No. 9, Mr. T. H. Brown; No. 10, Mr. C. Bateman; No. 11, Mr. F. M. Ruskin; No. 12, Mr. T. F. Plunkett; No. 13, Mr. J. Hardcastle; No. 14, Mr. T. C. Hayes; No. 15, Mr. G. Burton; No. 16, Mr. J. T. Todd; No. 17, Mr. W. Ranger; No. 18, Mr. A. McKinlay; No. 19, Mr. R. Swan.

Answers to Correspondents.

Staggers.

G.O'S. (Ingham)—The Poultry Instructor, Mr. J. Beard, advises:—

It was not mentioned if the specimen were the inside of a fowl or a duck. Another omission was a description of the nature, colour, and substance of the excreta—one of our best guides to diagnosis. The age of the ducks was also omitted, but it is assumed they were young ones, and were affected with staggers. This is a common disease in this State, and is usually attributed to bad feeding, dirty water, insufficient shade, &c. In many instances, however, outbreaks of staggers occur in yards where everything is scrupulously clean, and the ducklings properly fed and cared for. It is purely an infantile complaint, and only attacks ducklings during the hot summer months. So far, there is no known cure once the ducklings become affected, they being too young for medical treatment. Staggers is a disease which breeders are alone responsible for, and which may be easily avoided if due care is paid to the breeding stock, and proper attention given to the ducklings when hatched. Another thing to avoid—never breed from muscovies under two years old.

With reference to the two Leghorn fowls, there is no data to work on.

Poultry Feeding.

J.G.T. (Mundubbera)—

The Poultry Instructor, Mr. J. Beard, advises:—Best results are obtained by feeding moist mash in mornings and grain in the evening, with green stuff of some kind at midday. There is no set rule as regards the quantity of feed a fowl will eat. They should be given as much as they will eat and no more. After a couple of weeks you will learn just what quantity they require. The mash should consist of 2 parts pollard and 1 part bran, with 2 lb. oilcake to each 100 fowls, the oilcake to be scalded overnight, given every second morning, and meat, ½ oz. per bird each morning oilcake is not used. In lieu of meat, use 5 per cent desiccated meat, which means 5 lb. to every 100 lb. of mash; the safest way is to mix 100 mashes, add 5 lb. desiccated meat, and 22 oz. fine table salt. Mix all well together, and use as required. Evening, feed wheat, and a little maize once a week by way of a change. Always have available in a container a supply of grit, shell, and charcoal, and clean water.

Seed Cotton Sample.

A.J.B. (Toowong)—The Australian Cotton Growing Association comments on your sample as follows:—

This is a strong rather coarse lint, having a fibre length of 1.7/16 inch and being fairly even. This cotton corresponds to "Full Rough Peruvian," and there would probably be some difficulty in marketing same, as it is a speciality cotton, and not used in the manufacture of the ordinary cotton materials.

Dip Mixture—"Quinine" Plant.

H.T. (Boonah)—Mr. H. C. Quodling (Director of Agriculture) advises:—

The Department does not make a practice of commenting publicly as to the efficacy or otherwise of compounds of proprietary cattle dip mixtures. Our practice is to recommend a well-known formula for the preparation of an arsenical mixture for the destruction of timber.

The bitter bark you refer to is apparently what is known in many parts of the State as "Quinine." This is a most difficult plant to eradicate, and it is questionable whether the cutting off of the bushes close to the ground and swabbing the butts well with a poison will be efficacious, as the plants have an extensive root system, shoots from which are readily thrown out. In some localities where a heavy plough can be used it is considered more satisfactory to tear up the ground infested with the quinine roots instead of attempting to poison in the manner suggested. April and May should be the best months to poison should you decide to give this latter method a trial.

Egg Packing.

T. SEYMOUR (Hawkwood) writes:—

"The article 'Californian Methods of Poultry Raising and Marketing—I.,' printed in the last issue of the Journal I read with much pleasure, and one item which I took particular notice of was that, 'The farmer buys egg-boxes holding thirty dozen from the co-operative society.' I would be pleased if you could describe that particular box in the Journal, as to the shape, size, and packing contents, or method of packing. Not only myself but many other farmers, I am sure, would be pleased to see the box described."

A description and design of an egg container suitable for the Australian trade is being prepared for the Journal, and will be published shortly.

"Ropiness" in Bread.

R.T.C. (Tarvano)—

The following extract is from Jago's "Technology of Bread Making," which the Agricultural Chemist (Mr. Brünnich) states will give you the information you require:—

Occurrence.—During hot weather bread is liable to an outbreak of the disease called "rope." Its first manifestations usually occur in from twelve to forty-eight hours after the bread leaves the oven.

Nature and Symptoms.—The bread acquires a faint sickly odour, and the crumb is infected with brownish spots, which are larger the nearer the centre of the loaf. With the progress of the disease, the spots spread and the interior of the loaf becomes moist and sticky. The infected portions may be drawn out into long threads, and hence the name of rope. With the continuation of the disease, the crumb of the bread breaks down into a molasses-like mass, and emits an exceedingly disagreeable valerian-like odour.

Susceptibility.—Breads containing bran and germ, such as whole-meal, certain patent breads, and rye bread, are all particularly susceptible. Of those made from white flour, the grades composed of the heart of the endosperm—*i.e.*, the best patent flours—are less likely to produce rope than the lower grade flours, which are more or less contaminated with dust and bran fragments.

Origin.—All modern writers agree in ascribing rope to bacterial activity.

Conclusions.—Elevated temperature appears to be absolutely necessary to the development of ropiness in bread. Even when the bacillus is present in large numbers, moisture alone, when the temperature is low, is incapable of causing its appearance.

Effects of Acidity.—In making wort cultures, it was found that the presence of 0.1 per cent. of acetic acid prevented the growth of the organism. Lactic acid has a similar effect. The author of the paper was, therefore, led to try the effect of the presence of small quantities of acid in the dough. A number of tests were made and the results recorded in which acetic acid in quantities varying from 0.3 to 1.06 lb. to the sack were used, and large amounts of wort culture added. The general result was that acetic acid in quantities of from 0.3 to 0.7 lb. to the sack inhibited the development of rope. The minimum quantity would appear to be 0.3 lb., while any excess over 0.7 lb. injuriously affected the gluten. The smaller quantity of acetic acid is not prejudicial to the general qualities of the bread. Lactic acid may be employed instead of acetic acid, but the action is somewhat uncertain with quantities below 0.6 lb. per sack.

Summary.—Ropiness in bread is produced by varieties of *B. mesentericus* (Flugge), introduced into the dough through the flour, in which it sometimes occurs in large numbers, possibly coming from the bran coatings. Breads containing bran and low-grade white flours are most prone to develop ropiness. The bacillus is a prolific spore former, the spores being capable of resisting high temperatures for prolonged periods. Once present in the dough, development of the bacillus, after bread has been made, depends partly upon the reaction of the bread, and partly upon atmospheric conditions. Bread is only faintly acid in reaction, and always insufficiently so to naturally prevent the development and spread of ropiness, but if the acidity be increased by addition of small quantities of acetic acid to the dough, development can be prevented. Low temperature and dryness of the bread store tend to suppress development, but the maximum temperature of 18 deg. C. (65 deg. F.) cannot be exceeded without great risk. When a batch of bread is found to be ropy, all flour in stock should be at once tested, so as to locate the infected stock, and in the meantime fresh supplies of flour from a different source should be laid in.

Black Spot in Tomatoes.

E.M.H. (Broomie)—

Mr. J. M. Ward, Chief Instructor in Fruit Culture, advises:—

Spray with Bordeaux Mixture, at the strength of 3.3.40—that is, 3 lb. of bluestone, 3 lb. lime, to 40 gallons of water.

Bordeaux Mixture is made by dissolving the bluestone (by using hot water will dissolve much quicker) in one gallon of water, slake the lime, and make up each to about 5 gallons of water, pouring both liquids into a third vessel, adding sufficient water to make up to 40 gallons.

The milk of lime should first be passed through cheese cloth or some other material, for the purpose of straining.

The first spray to be applied when flowering commences, and to be followed by one or two later applications.

Cotton Culture.

C.H.H.G. (Gayndah)—

The Cotton Adviser (Mr. W. G. Wells) replies:—It is suggested that the locatio of your cotton field in regard to the possibility of early frosts should b taken into consideration before expending any more labour on cultivatio I have not had sufficient experience in Queensland to know, nor does ther seem to be any data, as to just what length of time of frost-free conditio are necessary to develop the topmost squares of a cotton plant into ope mature bolls. Consequently, it is difficult to advise one as to just wha percentage of the top crop of squares (small flower buds) will develop th season.

Roughly speaking, it usually takes a period of about thirty days from the appea ance of the small square to the full opening of the flower, and from forty five to sixty days from the opening of the flower to the opening of th matured boll. Under the droughty conditions of this year, the developmen of both the flower bud and the matured boll has been greatly hastened i some districts, many of the bolls opening far in advance of the tim anticipated. It is, therefore, possible that a continuation of the presen droughty conditions may cause a forced development of the top crop o squares, and resulting in an early opening of the top crop of bolls, althoug it is also possible that there is not sufficient moisture in the soil to full develop the bolls formed from the late squares. You will, therefore, hav to take into consideration the abovementioned points, as well as the size o the plants, before deciding whether it is advisable to expend the amoun of labour sufficient to develop a good moisture retaining mulch of th surface soils.

In regard to the picking of the open cotton, I would suggest that you pay con siderable attention to the grade of the picking, in order to have only on grade of cotton in each bale or whatever container you use to ship the see cotton to the ginnery. There may be enough variation in the colour of th cotton to warrant penalising the dark coloured portions, thereby lessenin the value per lb. of the whole bale of cotton, especially if any of the blackis stained "unfluffed" locks are accidentally included, so it is highly advisabl not only to pick cotton free of all trash and leaves, but also free of an serious discolouration; although I might say that the slightly yellowish-tinge cotton, not the dark-brown or black, which was caused by the early Marc rains on the lower crop of opened bolls, may go into the regular cotto if not present to too great a degree.

The Farmers' Feathered Friends.

R.C.F. (Innisfail) writes suggesting the periodical publication of a list o protected birds, and says: "There is too much ignorance among folk wh shoot their friends. Knowledge of their value as pest destroyers can onl be broadcasted by the Press." Complete information on the subject wil appear in the May Journal.

Farm and Garden Notes for May.

Field.—May is usually a busy month with the farmer—more particularly the wheatgrower, with whom the final preparation of his land prior to sowing is the one important operation. Late maturing varieties should be in the ground by the middle of the month at the latest.

Cleveland, intended primarily for feeding off, should be sown not later than the end of April.

The necessity of pickling all wheat intended for sowing purposes is again emphasised; and for general purposes, combined with economy in cost of material, the bluestone and lime solution holds its own. To those who desire an easier but somewhat more costly method of treatment, carbonate of copper at the rate of 1 oz. to the bushel and used in a dry form is suggested.

Potatoes, which in many districts are still somewhat backward, should have by this time received their final cultivation and hilling-up.

The sowing of prairie grass on scrub areas may be continued, but should be finished this month. This is an excellent winter grass, and does well in many parts of Southern Queensland.

Root crops, sowings of which were made during April, should now receive special attention in the matter of thinning out and keeping the soil surface well tilled to prevent undue evaporation of moisture.

Every effort should be made to secure sufficient supplies of fodder for stock during the winter, conserved either in the form of silage or hay.

Cotton crops are now fast approaching the final stages of harvesting. Information relative to the despatch of seed cotton for treatment is dealt with in another portion of this issue.

Kitchen Garden.—Onions which have been planted in seed beds may now be transplanted. The ground should long since have been thoroughly cleaned, pulverised, and should be rolled previous to transplanting. Onions may still be sown in the open on clean and well-prepared ground. In favourable weather plant out cabbages, lettuce, leeks, beetroot, endive, &c. Sowings may also be made of all these as well as of peas, broad beans, kohl-rabi, radishes, spinach, turnips, parsnips, and carrots, and, where sufficiently large enough, thinned out. Dig and prepare beds for asparagus, using plenty of well-rotted farmyard manure.

Flower Garden.—Planting and transplanting may be carried out simultaneously during this month in showery weather; the plants will thus be fully established before the early frosts set in. Camellias and gardenias may be safely transplanted, also such soft-wooded plants as verbenas, petunias, pentstemons, heliotrope, &c. Cut back and prune all trees and shrubs ready for digging. Dahlia roots should be taken up and placed in a shady situation out of doors. Plant bulbs, such as anemones, ranunculus, snowflakes, freesias, ixias, watsonias, iris, narcissus, daffodils, &c. Tulips will not suit the Queensland climate, but hyacinths may be tried, although success is doubtful. All shades and screens may now be removed to enable the plants to get the full benefit of the air. Fork in the mulching, and keep the walks free from weeds. Clip hedges and edgings.

Orchard Notes for May.

THE COAST DISTRICTS.

In these notes for the past two months the attention of citrus-growers has been called to the extreme importance of their taking every possible care in gathering, handling, packing, and marketing, as the heavy losses that frequently occur in Southern shipments can only be prevented by so treating the fruit that it is not bruised or otherwise injured. It has been pointed out that no citrus fruit in which the skin is perfect and free from injury of any kind can become specked or blue-mouldy, as the fungus causing the trouble cannot obtain an entry into any fruit in which the skin is intact. Growers are, therefore, again warned of the risk they run by sending blemished fruit South, and are urged to exercise the greatest care in the handling of their fruit. No sounder advice has been given in these notes than that dealing with the gathering, handling, grading, packing, and marketing, not only of citrus, but of all other classes of fruit.

It is equally as important to know how to dispose of fruit to the best advantage as it is to know how to grow it. To say the least, it is very bad business to go to the expense of planting and caring for an orchard until it becomes productive and then neglect to take the necessary care in the marketing of the resultant crop. Main crop lemons should be cut and cured now, instead of being allowed to remain on the tree to develop thick skins and coarseness. As soon as the fruit shows the first signs of colour or is large enough to cure down to about from 2¼ to 2½ in. in diameter, it should be picked, care being taken to handle it very gently, as the secret of successfully curing and keeping this fruit is to see that the skin is not injured in the slightest, as even very slight injuries induce decay or specking. All citrus fruits must be sweated for at least seven days before being sent to the Southern States, as this permits of the majority of specky or fly-infested fruits being rejected. Citrus trees may be planted during this month, provided the land has been properly prepared and is in a fit state to receive them; if not, it is better to delay the planting till the land is right.

In planting, always see that the ground immediately below the base of the tree is well broken up, so that the main roots can penetrate deeply into the soil and not run on the surface. If this is done and the trees are planted so that the roots are given a downward tendency, and all roots tending to grow on or near the surface are removed, the tree will have a much better hold of the soil and, owing to the absence of purely surface roots, the land can be kept well and deeply cultivated, and be thus able to retain an adequate supply of moisture in dry periods. No not forget to prune well back when planting, or to cut away all broken roots.

All orchards, pineapple and banana plantations should be kept clean and free from all weed growth, and the soil should be well worked so as to retain moisture.

Custard apples will be coming forward in quantity, and the greatest care should be taken to see that they are properly graded and packed for the Southern markets, only one layer of one sized fruit being packed in the special cases provided for this fruit—cases which permit of the packing of fruit ranging from 4 to 6 in. in diameter in a single layer.

Slowly acting manures—such as meatworks manures—may be applied to orchards and vineyards during the month; and lime can be applied where necessary. Land intended for planting with pineapples or bananas during the coming spring can be got ready now, as, in the case of pineapples, it is a good plan to allow the land to lie fallow and sweeten for some time before planting; and, in the case of bananas, scrub fallen now gets a good chance of drying thoroughly before it is fired in spring, a good burn being thus secured.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Clean up all orchards and vineyards, destroy all weeds and rubbish likely to harbour fruit pests of any kind, and keep the surface of the soil well stirred, so as to give birds and predaceous insects every chance to destroy any fruit fly pupæ which may be harbouring in the soil. If this is done, many pests that would otherwise find shelter and thus be able to live through the winter will be exposed to both natural enemies and cold.

Further, it is a good plan to clean up the land before pruning takes place as, if delayed till the pruning has been finished, the land is apt to dry out in a droughty season.

Pruning can be started on such varieties as have shed their leaves towards the end of the month, as it is a good plan to get this work through as early in the season as possible, instead of putting it off until spring. Early-pruned trees develop their buds better than those pruned late in the season. These remarks refer to trees—*not vines,* as the later vines are pruned in the season the better in the Granite Belt District, as late pruned vines stand a better chance to escape injury by late spring frosts.

All worthless, badly diseased, or worn-out trees that are no longer profitable, and which are not worth working over, should be taken out now and burnt, as they are only a menace and a harbour for pests.

Land intended for planting should be got ready as soon as possible, as, if ploughed up roughly and allowed to remain exposed to the winter frosts, it will become sweetened and the trees planted in it will come away much better than if set out in raw land. In any case the land must be properly prepared, for once the trees are planted it is a difficult matter to get the whole of the land as well worked as is possible prior to planting.

Slowly acting manures—such as ground island phosphates or basic phosphates—may be applied to orchards and vineyards. They are not easily washed out of the soil, and will become slowly available and thus ready for the use of the trees or vines during their spring growth. Lime may also be applied where necessary.

This is a good time to attend to any drains—surface, cut-off, or underground. The two former should be cleaned out, and in the case of the latter all outlets should be examined to see that they are quite clear and that there is a good getaway for the drainage water. New drains may also be put in where required.

In the warmer parts citrus fruits will be ready for marketing, and lemons ready for cutting and curing. The same advice that has been given with respect to coast-grown fruit applies equally to that grown inland; and growers will find that careful handling of the fruit will pay them well. Lemons grown inland are, as a rule, of superior quality to those grown on the coast, but are apt to become too large if left too long on the trees, so it is advisable to cut and cure them as soon as they are ready. If this is done and they are properly handled, they may be kept for months, and will be equal to any that are imported.

If the weather is very dry, citrus trees may require an irrigation, but, unless the trees are showing signs of distress, it is better to depend on the cultivation of the soil to retain the necessary moisture, as the application of water now is apt to cause the fruit to become soft and puffy, so that it will not keep or carry well.

Land intended for new orchards should be got ready at once, as it is advisable to plant fairly early in the season in order that the trees may become established before the weather again becomes hot and dry. If the ground is dry at the time of planting, set the trees in the usual manner and cover the roots with a little soil; then give them a good soaking; and when the water has soaked into the soil, fill the hole with dry soil. This is much better than surface watering.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1923.	APRIL.		MAY.		JUNE.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·3	5·49	6·20	5·19	6·37	5·2
2	6·4	5·48	6·20	5·18	6·37	5·2
3	6·4	5·47	6·21	5·17	6·38	5·2
4	6·5	5·46	6·21	5·16	6·38	5·2
5	6·5	5·45	6·22	5·15	6·39	5·1
6	6·6	5·44	5·22	5·14	6·39	5·1
7	6·6	5·43	6·23	5·13	6·40	5·1
8	6·7	5·42	6·23	5·13	6·40	5·1
9	6·7	5·41	6·24	5·12	6·41	5·1
10	6·8	5·40	6·24	5·12	6·41	5·1
11	6·8	5·39	6·25	5·11	6·41	5·1
12	6·9	5·37	6·26	5·11	6·42	5·1
13	6·9	5·36	6·26	5·10	6·42	5·1
14	6·10	5·35	6·27	5·10	6·42	5·1
15	6·10	5·34	6·27	5·9	6·42	5·2
16	6·11	5·32	6·28	5·8	6·43	5·2
17	6·11	5·31	6·29	5·8	6·43	5·2
18	6·12	5·30	6·29	5·7	6·43	5·2
19	6·12	5·29	6·30	5·7	6·43	5·2
20	6·13	5·28	5·30	5·6	6·44	5·2
21	6·14	5·27	6·31	5·6	6·44	5·2
22	6·14	5·26	6·31	5·5	6·44	5·2
23	6·15	5·25	6·32	5·5	6·44	5·3
24	6·15	5·24	6·32	5·4	6·44	5·3
25	6·16	5·23	6·33	5·4	6·45	5·3
26	6·17	5·22	6·34	5·4	6·45	5·4
27	6·17	5·21	6·34	5·3	6·45	5·4
28	6·18	5·21	6·35	5·3	6·45	5·4
29	6·18	5·20	6·35	5·3	6·45	5·5
30	6·19	5·20	6·36	5·3	6·45	5·5
31	...	...	6·36	5·2	...	...

PHASES OF THE MOON, OCCULTATIONS, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania when "Summer" Time is not used.

1 April	○	Full Moon	11 10 p.m.
8 „	☽	Last Quarter	3 22 p.m.
16 „	●	New Moon	4 28 p.m.
24 „	☾	First Quarter	3 20 p.m.

Perigee on 2nd at 7.24 a.m., and 30th at 6.24 p.m.

The Full Moon will be apparently very near to Saturn and Spica on the nights of April 1 and 2.

On the 19th the Moon in Crescent form will pass Mars soon after Sunset.

On Sunday, 29th April, an interesting Occultation of Saturn will take place about 5 p.m., Saturn reappearing about 6 p.m. Saturn will also be Occulted on 26th May, about Midnight.

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1 May	○	Full Moon	7 30 a.m.
8 „	☽	Last Quarter	4 18 a.m.
16 „	●	New Moon	8 38 a.m.
24 „	☾	First Quarter	12 25 p.m.
30 „	○	Full Moon	3 7 p.m.

Apogee on the 13th, at 2.48 p.m.
Perigee on the 29th, at 1.48 a.m.

Jupiter will be in opposition to the Sun at Midnight on the 5th, when it will be nearly overhead.

Mercury being at its greatest eastern elongation about the 5th should be visible between the Pleiades and Hyades soon after Sunset.

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6 June	☽	Last Quarter	7 19 p.m.
14 „	●	New Moon	10 42 p.m
22 „	☾	First Quarter	6 46 a m.
28 „	○	Full Moon	11 4 p.m.

Apogee on the 10th, at 4.30 a.m.
Perigee on the 25th, at 11.30 p.m.

About an hour before Sunrise on the 12th the Moon in Crescent form and the beautiful planet Venus will afford a fine celestial picture somewhat low down in the East with the Pleiades north of them.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter, and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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QUEENSLAND AGRICULTURAL JOURNAL

VOL. XIX. MAY, 1923. PART 5.

Event and Comment.

The Current Issue.

Among the more important features this month is a continuation of notes on the organisation of the agricultural industry, in the course of which the principles and practice of co-operation are lucidly discussed. Some very valuable tables of soil and other chemical analyses are included in a continuation of a summary of experiments carried out by the Bureau of Sugar Experiment Stations. Notes on picking, grading, and packing of fruits form another notable contribution. The notes are profusely illustrated and will be issued later in bulletin form. What has been described as the Jensenian theory of sunspots and their climatic relationship is covered in a very interesting article. Illustrations and other usual features are well maintained and in all respects the May Journal is a very informative number.

Co-operative Marketing.

As has been indicated directly or impliedly in the course of notes on the organisation of the agricultural industry in this and preceding issues, and presented lucidly and attractively from first-hand information and experience in California, where co-operative marketing has been developed to a high degree of efficiency and success, the aim of the Queensland Producers' Association should be early and effective control of the selling end of the farmer's business. The people of Queensland have awakened to the truth that agricultural prosperity spells general prosperity and more attention is being given to the fact that, as in other enterprises, business efficiency and business organisation must be applied to the marketing of primary products. The people of the cities are beginning to realise that rural problems are their problems, and that their interests are inseparable from the interests of those engaged in the State's great basic industry. Hence, any improvement on existing systems of marketing and distribution must naturally benefit both producer and consumer alike. It is felt that the co-operative principle which has proved so successful in farmers' manufacturing ventures, particularly in the dairying industry, must extend inevitably

to merchandising activities, hence the necessity of closer study of systems of co-operative marketing. In nearly every civilised country farmers are now engaged in some form of combined bargaining both in respect to their requirements and disposal of their produce. In countries like Denmark, where rural co-operative enterprises may be seen in full and vigorous working, organised co-operative marketing of farm products has been in vogue for more than half a century. In the dairying industry there more than 90 per cent. of the producers are completely and co-operatively organised, and in the live stock and other sections they are organised to the extent of over 85 per cent. In Great Britain, Ireland, the countries of Europe, Canada, and the United States of America growers have absorbed the lessons of co-operation, not only in relation to marketing, but also in respect to credits and allied problems. To all who take time off to think it seems amazing that the industry that creates so much national wealth, that takes so much out of the consumer, leaves so little for the men who primarily create that wealth. It is plainly the job of the Queensland Producers' Association to see that in this State existing anomalies and disabilities are corrected and removed and that, so far as its power extends, the real business interests of the wealth producers are adequately conserved.

Farmers are Wide Awake.

The farmers of Queensland have been stung into action and now realise fully the necessity of a proper knowledge and handling of the manifold problems peculiar to their calling. If the cityward migration of the rural population, a tendency so strongly marked in Australia though common to all countries—a tendency calamitous from a national point of view—and consequent decline in agriculture are to be checked effectively, it can only be done by making agriculture both attractive and profitable. If enlightened country youths are denied ordinary prospects, advantages, wholesome recreation, amenities and opportunities of social and business life, then they are not likely to stay on the farm. Make agriculture profitable and a long way will have been gone towards solving that and many more of our present problems. Farmers with a knowledge of their power and driving force as an organised body demand, naturally, a fair return on invested capital and energy. Of the objects now in view, and with the means of attainment now available, the establishment and extension of co-operative enterprises are among the most important. Hitherto farmers have been content to co-operate up to the railway truck, but now they demand an effective voice in the marketing of their products. They aim to regulate the selling end of their business—regulation that will ensure security and other benefits that naturally accrue from stabilised industry. California provides an outstanding example of complete co-operation in the agricultural industry, and a study of the lines on which the system works supplies a stimulus for extending to their limit the means now in the hands of the farmers of this State through the Queensland Producers' Association.

The Queensland University and Agriculture.

In the course of an address as Chancellor of the Queensland University on the occasion of the annual conferring of degrees, His Excellency the Governor (Sir Matthew Nathan) mentioned appreciatively the benefactions received under the Walter and Eliza Hall Trust, through which useful work has been done in combating the blow-fly pest so ruinous in its effects on the pastoral industry. That work still calls for heavy expenditure for its completion; and it is only one of the pressing problems confronting our rural industries. The importance of applying science to all sections of agriculture is recognised, particularly in relation to fruit and sugar. Much has been done and much remains to be done. The munificent gift by Dr. Mayne, of some hundreds of acres on the Brisbane River within easy reach of the city, will doubtlessly accelerate the establishment by the University Senate of a base for experimental and research work in connection with agriculture.

Cotton Ratoons.

Replying recently to a deputation representative of a Central District Council of Agriculture, the Premier (Hon. E. G. Theodore) said that the way was not clear to remove the restrictions on the production of cotton ratoons. It was the Lancashire

market, continued Mr. Theodore, upon which, so far as he knew, we had to depend solely. It was hoped to build up to a million acres in Queensland; for its product a large market was wanted, and the only market he knew of was that of Lancashire. The Lancashire people definitely said that they would not use ratoon cotton, and that if even only a small percentage of it was included it would depreciate the whole crop. It would be very foolish not to heed that point. Then there was the position in respect of pests to be considered. The representation made by the delegation to the Prime Minister and himself were strongly worded and very definite. This restriction was a condition under which the Commonwealth guarantee was made, and also of the Queensland Government's guarantee. Mr. Crompton Wood himself had suggested that ultimately there might be an outlet in the East for ratoon cotton. He (Mr. Theodore) understood that the Lancashire mills only bought ratoon cotton from one country—they took the whole of its crop—and the growers, who produced that crop by black labour, had to be satisfied with much smaller prices than that paid for cotton produced elsewhere. Messrs. Crompton Wood and Harold Parker, and others they represented, it must be remembered, added the Premier, were not only buyers of cotton, but they were large investors in the cotton industry here. It would be seen that they had much at stake, and when it was said on their behalf that the ratoon article would not be accepted as legal tender, then it was obvious that it must be an inferior article from their point of view. The Government policy was to bring into force legislation to provide for the proper regulation of the industry, and for its preservation and rapid expansion. That involved the prohibition of ratoon cotton and the absolute destruction of the old shrubs and debris in the fields. Before this legislation was settled the Council of Agriculture would have the opportunity of consulting with and of advising the Government as to its views on the subject.

Small Ratoon Area.

Mr. Theodore said that a definite policy must be maintained. It was noteworthy, by the way, that only 240 acres of ratoon cotton were harvested in Queensland this year out of the 40,000 acres under crop. He considered that the correct policy for the Government to adopt was not to agree to ratoon cotton being produced until it was proved that it was the right thing. He felt that he would be recreant to his trust if he gave the undertaking sought. There had never been any doubt as to the attitude of the delegation on the ratoon question, and that was the attitude of the Government.

The Dairy Bull.

The change in the appreciation of the influence of the bull on the milk yielding qualities of the offspring since the movement for improving the dairying qualities of milking breeds began twenty-five years ago is agreeably significant. In a cutting from the London "Times" (5th March, 1923), sent to us by the Agent-General (Hon. J. A. Fihelly), it is noted that the discovery of the real value of the bull in a dairy herd has been of great importance to farmers and breeders in the Old Country, where the art of breeding and feeding has developed to a high point. It has cheapened and expedited the process of grading up the milking records of herds where the knowledge has been wisely applied. The purchase of a bull at a three and even four-figure price may savour of extravagance in pursuit of some wild notion, but experience has given a generous measure of justification for such liberality. If the calculation errs, it is usually the animal rather than the price that is at fault. After all, a high price for a bull entails a smaller total outlay than the purchase of many costly cows or heifers. The influence of the latter is not to be despised by any means; but results have shown that astonishing improvement can be effected quickly, and, in a broad sense, inexpensively, through the introduction of suitable sires. This is supported by definite testimony pertaining to all breeds. In fact, the reputations of many of the best-known herds have been made through the influences of the sires used. The choice of a bull—or of a sire of any kind—is one of the most difficult duties of a stockowner. It is aggravated by the fact that the sire is as impressive in transmitting undesirable influences as he is in giving the qualities that the breeder wishes to cultivate. An error in introducing a sire may be very costly, hence the importance of systematic and minute study of lineage and individual records.

ORGANISATION OF THE AGRICULTURAL INDUSTRY IN QUEENSLAND—III.

BY J. D. STORY, Chairman Administrative Committee, Council of Agriculture; and J. F. F. REID, Editor of Publications, Department of Agriculture and Stock.

In the first article of this series, published in the March Journal, the American Farm Bureau Organisation was described and compared with the plan of the Queensland Producers' Association. In the second instalment, which appeared in the April Journal, various phases of American marketing methods, relating more particularly to fruit, but capable of more or less diversified application, were discussed. This article is a continuation of the series and deals with primary producers' marketing problems and co-operation generally.—Ed.

CO-OPERATION.

Historical Sketch.

The fundamental ideas of individuals combining forces or co-operating in various ways to achieve certain objects are not by any means the product of recent years. Centuries ago the difficulties of foreign trade made it extremely important that, even in European ports, Englishmen should hold together and maintain by good conduct and a high standard of honest trading the reputation of their countrymen. It was found that one dishonest or greedy English merchant could endanger the trade in a country for all the rest, by selling inferior wares and by other bad conduct calculated to make Englishmen and their goods unpopular. Such considerations led to the formation of companies of merchants, to each of which was given the sole right of trading to a particular region, and also the power to make rules and regulations to be observed by every individual member.

At least one such company was originated as early as the 14th century and was known as the Company of Merchant Adventurers of England. Each merchant or firm of merchants included in the company traded separately and undertook separate risks, but was bound to observe the rules of the company and to pay entrance fees and other dues to its common funds. In each foreign port to which the members traded they erected what was known as a factory, which combined residential quarters for the staffs, warehouses for storing goods, and counting-houses for the sale of goods. Strict rules were imposed regarding the conduct of members and the quality, price, and quantity of goods sold.

Since the establishment of this company there have, of course, been many changes in world conditions. It is important, however, to note that with changing conditions, different types of organisations were brought into being to meet the new requirements, and that the tendency for persons to combine for given purposes is stronger to-day than ever before. At present we have various forms of associations—business partnerships; private companies; public companies; firms having provision for profit sharing; co-operative companies, associations, or societies—and in all of these there is the underlying principle of combining forces to attain specific objects which the members individually could not attain.

Mutual Help—Service versus Self.

It is recognised that individuals cannot progress beyond a certain point so long as they are prepared only to receive help from others and give nothing in return. American business men hold conventions for each class of occupation or business, and the men who attend do not merely get all the information they can; but they relate their own experiences, exchange views, discuss matters of mutual interest, and help others to solve problems that confront them. Having given freely they receive freely, and the result is that the whole of the industries of the nation are raised to a higher standard of efficiency. Such mutual help or co-operation within an industry is not, however, a cure for all ills. The man who is industrious and applies himself to his work along sound lines must fare better than the man who is indolent and indifferent; the man who is thrifty will be better off than the man who saves nothing; the man who has executive ability, who can plan, organise, and direct others, and so make his business more productive, will advance further than the man who only does what he is told.

The Relationship of Industry to State.

But each industry must be regarded as more than a collection of individuals competing for the supply of certain markets—it stands in a well-defined relationship to the State, to the consuming public, and to transport and financial systems, on which all trades and businesses depend. It has its own problems, its own questions of organisation and methods of production, its own peculiar difficulties regarding access to markets, and should have its own organisation. In that organisation all questions affecting the welfare of the industry should be discussed monthly, fortnightly, or weekly as the conditions may require. The whole experience of the industry, the knowledge of its most experienced members should be open to all members, who will then have more than their own knowledge and ability to rely on, and will be able, if they so desire, to proceed along sound lines, to make use of better methods and to reduce the chances of failure.

A Concrete Example.

As a concrete example of the need of such co-operation in the agricultural industry, it was found that in America in 1921, considerable difficulty was experienced in the marketing and distribution of farm products. Because of its inter-relationship with agriculture, the social and economic structure of the whole nation was vitally involved. This condition was the result of many complex factors brought about in a measure by the readjustments consequent upon the close of the war; but the most important reason was the unpreparedness of the American farmer to handle, through collective action, the problems which as an individual he was unable to solve or even to influence.

It is worthy of note that in California, where the horticultural industries were well organised, the producers were able in most cases to market their crops at prices in excess of the cost of production; and that these co-operative organisations of growers suffered comparatively little from the general business depression.

The Essentials of Co-operative Agricultural Organisation.

What then are the essentials of co-operative agricultural organisation? The late Mr. G. H. Powell, who was for nearly ten years General Manager of the California Fruitgrowers' Exchange, and who was regarded as a national figure in agricultural affairs, has supplied the following definition:—

"Co-operation among farmers may be defined as an enterprise in which the members form an agency through which they conduct the business for their greatest mutual advantage. To be co-operative it must be composed of farmers exclusively, and managed by them, and the benefits must be returned to them in proportion to the use or the patronage of each. That part of the capital necessary to create the agency and its facilities, which finds an expression in the management of the association through the voting of the members, should preferably be contributed by them in proportion to the use which each makes of the organisation. And it is desirable that the capital of each member should be kept progressively proportional to the individual shipments, or purchases, or other uses made of the agency as nearly as this may be done. In a co-operative agency, capital which creates the permanent investment, should be considered as a means of providing the facilities needed by the members; it must not be a fund on which a dividend is paid in excess of a fair rate of interest. Working capital may, of course, be provided in other customary ways.

"In forming a co-operative marketing association, it is fundamental that it be a proper legal entity, with sufficient powers to transact the business for which it is formed, to finance its activities, and, when necessary, to secure its obligations—thus, equally with other corporations, safeguarding the interests of its members, as well as of the institutions with which it transacts business."

Producers' Problems can only be Solved by Producers.

The questions which affect the stability and permanently successful development of the agricultural industry can only be worked out by the producers co-operatively. They will not be solved by anyone else because no one but the producer has a primary, vital interest in production. They will not be solved by an individual producer.

The progress that has been made in every question affecting the production of Californian citrus fruits, for example, has resulted exclusively from the initiative and the co-operation of producers. Those who handle the growers' product for them sometimes follow but they cannot lead in the progress of an industry. *Their* interest in the problems of production is secondary.

A co-operative organisation, to be permanently successful, must be founded on economic necessity. It must be composed exclusively of growers, and it must be financed exclusively by growers. None has succeeded in which the growers and the buyer and speculator are joined together, because the interests of the two are not the same. The grower's primary interest is in the permanent prosperity of his investment; the buyer's or speculator's is primarily in the success of his immediate business transactions. Only the man who owns the land and whose investment runs into the future is willing, or is in a financial position, to make investments that safeguard the future of an industry.

Legal Right to Organise.

Farmers should have the legal right to organise, to do those things that are vital to the economical and orderly conduct of their business from the production to the consumption of their products; to act collectively in doing what the individual farmer would otherwise do for himself; to form purchasing, warehousing, distributing, or other necessary agencies; to confer amongst themselves and to acquire and disseminate information for the orderly purchasing, distributing, and marketing of their supplies or crops; to finance their undertakings and to enter into financial relationships to handle agricultural problems.

Membership.

A co-operative organisation should have an open door policy—that is, one by which every grower, who will conform to the policies of the association, who will abide by its rules and regulations, and who will assume his share of its responsibilities, may be admitted to membership. It is equally important that a member be permitted to withdraw from the organisation if he should become dissatisfied, provided his withdrawal is in accordance with the by-law or contract provisions governing withdrawals. No grower should be held permanently in a co-operative association against his wish. In the long run the benefits of a co-operative association are the only things that will hold the members together.

Membership should be confined exclusively to producers engaged in the production of the particular commodities with which the association is concerned and who actually use its facilities. Those who would contribute capital only should never be admitted, because the permanent capital should be the medium through which the members provide the facilities for the transaction of their own business. Membership carried with it a responsibility on the part of each member to maintain the association in periods of adversity—a responsibility which is not likely to be felt unless the organisation is the farmer's own institution, developed and managed by him, through his chosen representatives, to promote and safeguard his own interests.

Agreements.

An association must be held together through an agreement or contract between the organisation and each member. Such a contract gives the organisation a stability which enables it to know what it is expected to do, to enter into dependable business relationships, and to make necessary financial or other preparations essential to the conduct of its affairs. Nevertheless, contracts cannot hold a group of farmers together against their will, and do not in themselves assure the permanency of an association. The association's greatest safeguard against disruption, as well as its strongest business asset, is the development of faith amongst its members, confidence in the director and management, and a growing conviction that the best method of meeting the farmers' common problems lies in their co-operative efforts.

Objects.

The objects for which the agricultural industry may be organised have been dealt with in a general way in the two previous articles. It might be emphasised here, however, that these objects will come under two main headings:—

(1) General questions affecting the industry which can to a great extent be dealt with by the farmers themselves in consultation and co-operation with State institutions, like the Department of Agriculture and the University, and which do not involve the raising of capital for specific purposes.

(2) Particular questions affecting particular sections of the industry, such as the marketing and distribution of products and of obtaining supplies, which will involve business arrangements with existing distributing agencies, or the creation of co-operative agencies for the marketing of members' products and the purchase of their requirements. These co-operative enterprises would require arrangements for the subscription of capital for the working of each undertaking.

The farmers engaged in the industry will themselves be the best judges of what is required to increase production and to render the labour entailed in that production as little irksome as possible. With the help of the State institutions referred to, the association of farmers should be able to evolve schemes and methods of meeting these requirements.

The farmers, however, may not be quite so well qualified to determine the essentials of successful marketing and distribution, and it may be helpful to state a few general principles which have been laid down in America as a result of the experiences of marketing associations.

Essentials to be Observed in the Formation of Marketing Associations.

The ultimate success of any co-operative marketing effort depends on the will of the farmer to co-operate, on a spirit of mutual confidence and trust in one another, on the development of the most adaptable forms of organisation and the most efficient management and procedure.

One cannot over-emphasise the fundamental necessity of confidence, faith, and sentiment among the members of a co-operative marketing association; nor can one overstate the need to develop and maintain mutual confidence, and to utilise every known means to keep the purposes and accomplishments of the organisation before the members and the general public.

Where possible local associations should be formed by small groups of growers who are neighbours and have confidence in one another. These neignbours should provide packing houses, warehouses, and other permanent facilities through the investment of their own capital; they should take part in the local management and be an intimate, personal part of the institutions. These local units become centres of vital influence for good in the community. They promote every activity that affects the upbuilding of country life, because the members learn to meet the problems together. Where a larger unit may be necessary, those responsible for its direction should never lose sight of the need for local participation and some degree of responsibility in the affairs of the organisation. Failure to do this and to keep the members fully informed is likely to result in a large impersonal association in which the individual member is removed from participation and responsibility in solving his local affairs. Because a large co-operative marketing organisation represents power its danger lies in the possibility of its becoming involved in political affairs, and in movements which, though worthy in themselves, have nothing to do with its primary purposes and can only lead to divided membership, factional control, and ultimate disruption.

THE CAPITAL IN A CO-OPERATIVE ORGANISATION.

The California Fruit Growers' Exchange, a central organisation which deals with general matters of administration on behalf of its District Exchanges and local associations, has no capital stock. Each year it estimates the cost *per box* of transacting its business, then levies an arbitrary assessment for the year, and at the end of each month renders a bill to each District Exchange for the number of boxes shipped during the month. It does not take the marketing cost out of the proceeds before returning them to the District Exchanges. At the end of the year, if a surplus has been accumulated, it is pro-rated to the District Exchanges on the basis of the shipments of each. The Exchange makes no profit, receives no dividends, accumulates no surplus.

When a producers' organisation requires capital for the purchase of supplies, erecting packing sheds, or for other purposes, the Exchange has worked out a plan by which the capital contribution of the stockholders is kept permanently proportionate to their shipments by the establishment of a revolving fund into which the stockholders agree to pay annually a specified amount per box on each box sold. Interest at the rate of 6 per cent. is paid on the capital so contributed, but no dividends are paid. The corporation is not formed for money-making purposes. The capital is necessary to provide the facilities through which the members transact their business, and both the benefits and capital contribution of the members are always kept proportional to the use which the member makes of his facilities. American agriculture can tell of the wrecks of all too many farmers' organisations that were formed as stock corporations, with disproportional capital contributions of the members, with no way to retain the capital within the organisation, or to keep it always proportional to the shipments of the members.

AVOIDABLE WASTE—TRADE CO-OPERATION.

The establishment of uniform grades for agricultural produce is one of the most important questions affecting American agriculture. It is equally important to the producer, the trade, and the consumer. The waste that occurs in badly-

handled, ungraded farm products is one of the leading causes of the high cost of distribution, because this waste must either be deducted from the farmer's price or added to the cost of distribution. It is important to the wholesale trade because the merchant cannot sell at low, gross margins unless foodstuffs are uniform and dependable in grade and quality. It is equally necessary to have an equitable, dependable supply of a good product in the hands of the retail merchant, if he is to add only reasonable margins in the sale of his products.

In the California citrus fruit industry, for example, the former average loss of one and one-half million dollars annually, caused by decay due to bad handling by the individual grower, has been practically eliminated by standardised association methods of harvesting and packing. The cost of distributing the fruit from the producer to the wholesale trade, exclusive of freight, has been reduced from 15 per cent. to 2½ per cent., including the cost of national advertising; while the dependable supplies furnished by the co-operative organisations have made it possible for the wholesale and retail trades to sell these commodities at gross margins not much in excess of those added in the case of non-perishable foodstuffs.

The California Fruit Growers' Exchange has proved that it is difficult for any fruit centre to become known in the markets of the country, and especially to the great consuming public, unless the fruit is handled, graded, and packed under standard rules and regulations, and sold under an association trade mark brand, each local unit retaining its own local brand in addition to the trade mark to identify the quality of the fruit of any district. To supply the quality required by customers the dealer buys on the known quality of the local brand, while the consumer buys on the advertised trade mark of the general association. The trade mark is the guarantee of the association to the consumer and the public. It represents a minimum standard grade, with various grades above the minimum representing the quality of fruit of each community.

An unadvertised local, or buyer's, brand may have been sold for years in a community and not be known to 2 per cent. of the consumers who have actually used the fruit, while a nationally advertised brand will be known to from 30 to 50 per cent. of the consumers in the same community.

Wasteful Speculation.

A co-operative organisation may be able to eliminate the unnecessary, wasteful speculation that is sometimes inherent in the purchase of farm products at the farm or local station, by selling through its own agents to the wholesale trade on arrival in the places where the products are to be consumed. This system of delivered sale, if well administered and adapted to an industry, assures a more dependable, equitable distribution; it eliminates speculation in purchase and in distribution, and it supplies the trade with the daily requirements at prices which must necessarily closely reflect the law of supply and demand.

In 1921, the delivered method of selling was one of the outstanding factors in saving some of the California horticultural industries from a collapse similar to that which occurred in other parts of the country. The production of the crop was financed by the growers' local bank. Through his organisation, the grower distributed his product throughout the country at his own risks—the banks did not have to finance a speculative buyer, thereby making it safer for them to finance the grower who produced the crop and distributed it in an organised, intelligent manner to the consuming centres. The wholesale trade bought their current requirements from the growers' agents on the arrival of the cars; the retail trade, in turn, bought their daily supplies from the wholesale dealer, thereby reducing the hazard of the banks that supplied the credit for the daily merchandising needs of the wholesale and retail trade.

AGENCIES OF DISTRIBUTION.

In every agricultural industry the crop needs to be financed, assembled, processed, packed or stored, and transported, and with or without further manufacture sold by the wholesale and retail trade to the consumer. There should be no antagonism between *essential* agencies involved, but rather a real understanding of the functions of each and a close co-operation between them. Until an industry has clearly analysed the problems, and has an accurate knowledge of financing and distributing processes, it is a mistake to assume that a remedy for the marketing difficulties lies in the elimination of one or more of the existing agencies of distribution. These agencies may have grown out of vital needs of distribution. Only after a farmers' organisation has proved that it can perform the same service more efficiently or more economically should it decide to eliminate any of the existing links in the chain of distribution. But it should co-operate with them in order that

there may be a clear understanding of each other's problems, a supplementing of each other's efforts, and a development of the simplest and most economical methods.

There should, therefore, be the closest co-operation between a producers' organisation and the wholesale and retail trade. The latter are the distributing agents which bring the producer and consumer together, and the span can be efficiently and economically bridged only when there is a mutual understanding of each other's problems. The producer cannot deliver his fruit to the consumer without the retailer. The risk and the cost are both prohibitive.

The system of trade which gives the widest distribution must be based on uniform supplies of evenly-graded fruit, backed by national advertising. Given these conditions, the trade can then specialise on a commodity, display it prominently, advertise it locally for immediate results, and make quick turnovers at a relatively low mark-up, thereby increasing distribution at a lower cost to the consumer, but a larger annual profit to the merchant.

Anything that can be done by the State or nation which is impossible of achievement, either by the individual farmer or his organisation, that helps them to a better understanding of their problems, that develops the factors which affect the handling, storage, and transportation of crops, that furnishes dependable information on crop production, or other information that serves as a guide to intelligent distribution and sale, and that insures the principle of a "square deal" in all business relationships, is in the interest of the producer, the trade, and the public alike. It is in the public interest that those branches of the Department of Agriculture, which furnish this basic crop-production information, as well as the regulatory branches of the department, shall be adequately supported and effectively developed.

THE NEED OF NATIONAL ADVERTISING.

Advertising to the consumer is fundamental in increasing the consumption of a rapidly increasing production. It increases the per capita consumption and develops new consumers. It widens the growers' markets and produces a consumer demand which helps the wholesaler and the retailer, who are primarily order takers. It strengthens the relations between the grower, the trade and the consumer. It makes it possible for the wholesaler and retailer to sell quickly at lower margins per turnover, and to give the consumer a product uniformly distributed at a lower cost of distribution.

A Pride and an Investment.

There has been no single factor that has strengthened the California Fruit Growers' Exchange among its members as much as its national advertising. The growers have a pride and an investment in the trade mark "Sunkist," that makes the enforcement of the grading rules comparatively easy. They have a pride in putting out a good product. They place "Sunkist" signs on their packing houses and on their groves. An association that deliberately breaks the rules quickly falls into disrepute among the other associations.

The Fundamentals.

The fundamentals that are essential to a growers' campaign of national advertising may be thus summarised. The growers must be organised on a sound permanent basis; they must have a large volume and pack their fruit under standard grades; they must provide a system of inspection to enforce the rules; they must own and control their trade mark; and they must establish a system of national distribution to the wholesale trade in order to insure evenness of distribution.

A Solid Foundation of Quality.

Every successful selling campaign must be built on the solid foundation of quality. If a product is of good quality it will pay to tell people about it. Some of those who hear will buy, and if the quality pleases them they will buy again and tell others. Co-operative advertising campaigns cannot trifle with details; the controlling motive must be the greatest good for the greatest number. If the problems do not affect all members of the industry, those members will not be deeply concerned.

The greatest difficulty in selling, however, does not always come from our competitors, but rather from the public's ignorance or lack of appreciation of the product and its uses. Often the greatest opportunity for increasing sales lies in increasing the basic market—in educating public demand.

A Supplement of Personal Salesmanship.

Co-operative advertising can assist by supplementing personal salesmanship and by making it more effective. It can correct misunderstandings; it can foster goodwill by pointing out services and policies of mutual benefit; it can educate the consumer to be a more discriminating buyer and set up trade marks for the buyer's protection; it can promote standardisation and dependability for developing incentives for uniformity in quality.

RELATION TO THE PUBLIC.

A co-operative organisation has a public interest relationship, which it must scrupulously fulfil, as well as the relationship to its members. It cannot live for itself alone.

A co-operative organisation of fruitgrowers, by illustration, should be an important factor in reducing the cost of living as well as insuring the growers a fair price for their fruit if it is to play a vital part in future social and economic life. The producer is entitled to a fair return on the cost of production, if the law of supply and demand warrants it.

Reduction of Costs Means Increased Output.

The co-operative organisation, however, should make a larger output possible by reducing the cost of production through the co-operative purchasing of supplies, by the joint use of tractors and other implements, and by co-operative pruning, fumigation, and harvesting. It should reduce the cost of packing by the more economical method of co-operatively purchasing packing-house supplies and by co-operative packing; it should reduce the cost of distribution to the wholesale trade by even distribution and national advertising, and it should help to place the wholesale and retail distribution of fruit on a merchandising rather than a speculative basis. By doing these things it reduces the distributing costs of the trade to the consumer.

Expenses of Association should not mean Restricted Production.

These are public relationships that should be inherent in the legal right of producers to organise. They are responsibilities which no co-operative organisation can safely avoid. No group of producers has the right to operate collectively if it uses its power of organisation to restrict production, to lessen or arbitrarily control the supply, to permit avoidable wastes that result from improper handling in preparing fruit for market, to speculate, to profiteer, to create any condition through the power of its organisation that is discriminatory or unfair to the public or to a competitor, or which permits a member, an officer, or an employee an advantage, a rebate, or a preference that is not open to all alike.

A large share of the cost of food is represented in the cost of selling or marketing. As a public question, this fact has a vital significance in these times of high living cost on account of the flow of population towards the cities. It gives new impetus and a new vision to the co-operative movement which, by simplifying the distributing process and reducing costs, may help to meet a present day social and economic need. Unless a producers' organisation confers a benefit on the public at large, as well as on the industry which it represents, its future as a vital part of the social and industrial fabric of the country is problematical; and the progress of co-operation will be measured by its ability to meet such problems.

[NOTE.—For much of the Californian information contained herein the writers are indebted to the late Mr. G. H. Powell and the officials of the California Fruit Growers' Exchange.—Ed.]

CONCLUSIONS.

A review of the principles laid down by American leaders of co-operative enterprise suggests—

I. That the Queensland Producers' Association, as the State Organisation of Queensland primary producers, should be representative of the whole of the agricultural industry.

II. That is members must conform to the policy which is determined by the majority, and which is calculated to be of the greatest good for the greatest number. They must be loyal to the Association; they must be unselfish and willing to assist each other; they must make available for the benefit of the industry the information they have collected and the results of their experience; and they must each take a personal and keen interest in the business of the Association.

III. That problems relating to the whole industry must be considered by the whole Association, and there must be equitable contribution of funds required to meet expenditure necessary for the conduct of the general business.

IV. That problems relating to particular sections of the industry or to specific districts must be considered by sectional bodies representative of those sections or districts. If capital is required for the benefit of particular sections or districts, or to establish local trading societies or other forms of co-operative enterprise, that capital must be contributed by the members concerned in the proportion in which they will participate in the benefits or use the facilities provided. Any such sectional bodies or societies must be linked up with the main Association, and the whole strength of the Association must be available, if necessary, to back up the actions of each or any section.

V. That the Association and every section of it must be willing and ready to co-operate with existing associations and agencies, with the Agricultural Department and the University, and with any other institutions that are willing to co-operate in the solving of problems relating to the economical production and orderly distribution and marketing of primary products.

An Association which will work energetically and consistently on these lines will do for the agricultural industry in Queensland what no other forces can do. In due time it will provide an organisation which will know better than any individual or department what is best for the industry; it will advise the Government of the day as to necessary agricultural legislation and regulation; it will by full and free discussion educate its members in regard to its relative importance in the forces that go to make up the State; it will, by co-operation with other bodies and agencies, arrive at a correct understanding of the interdependence of industries and of the importance of having all the forces of the State perform their proper functions and of their receiving their due proportion of the State's wealth.

Such, then, are the possibilities ahead of the Queensland Producers' Association, and the Association will progress towards the fulfilment of those possibilities just so quickly as its members are ready to progress. Wide powers have been placed in the hands of Queensland producers—it is for these producers to use those powers to their full extent or to render them inoperative by neglect or indifference. A co-operative association is not a magic circle that will banish the troubles of members immediately they join; but, if the producers of Queensland will act in concert, help one another, plan and work for the common good, they will accomplish much more for the general prosperity of the industry, and for its stabilisation and extension, than they can possibly do individually—that at least has been the result of co-operation in other industries and in other countries.

THE COTTON GUARANTEE.

The Coming Cotton Planting—Further Encouragement of Growers.

In January last an announcement was made that for the year ending the 31st July, 1924, the advance to be made by the Government for seed cotton delivered at the nearest ginnery or as might be otherwise arranged would be for seed plant cotton of good quality free from disease and defects of 1¼-in. staple 5½d. a lb., and for less than 1¼-in. staple 4½d. a lb. The advance to be limited to areas not exceeding 50 acres.

The Minister for Agriculture (Hon. W. N. Gillies) now desires to make it clearly known to growers that the Government, owing to the drought and the consequent circumstances of the industry, has decided to make the advance for the year ending the 31st July, 1924, as follows:—

For seed plant cotton of good quality, free from disease and defects of 1¼-in. staple	5½d. a lb.
If of lesser staple than 1¼-in.	5d. a lb.

The other conditions issued in January last in relation to the advance to remain.

Thus it will be seen that growers will, owing to this decision of the Government, be in a better position to make their arrangements for the coming planting. No alteration has been made in relation to the advance for seed cotton of 1¼-in. staple, and for seed cotton of lesser staple the advance has been increased by ½d. a lb. over the January conditions, and the encouragement thus given should ensure an area under cotton that will be considerably in excess of the area planted in 1922-1923 with a great increase in the harvest; if there is an improvement in the season on that of last year, that can be reasonably looked for.

COTTON CULTIVATION—A GROWER'S EXPERIENCE.

Mr. Alec. W. van Tienhoven, a cotton-grower, of Alma Creek, N.Q., writes, *inter alia*, to "The Queensland Producer":—I planted about 5 acres with cotton in the second week of September (against expert advice), which took about 80 lb. of seed, or about 16 lb. per acre. I never thinned this out (which I did last year, with no beneficial results), but I got the rows 4 ft. 6 in. apart, and kept it well cultivated. The results are that the first picking gave nine bales of (average) 386 lb. of seed cotton, ginnery weight at Wowan, which is, in regard to the dry weather, not a bad result. The second picking will, to all appearances, turn out very good. In this cotton I never found a corn-grub or any other kind of pest, which are doing so much damage to the late planted crops.

In regard to the shedding of the flowers by little bolls, I would like to state that the same happened on my well-spaced cotton of last year, and that several of my neighbours were complaining of the same trouble.

In the beginning of October I planted another lot, also about 16 lb. of seed to the acre, and no thinning out, which is now being picked and giving a fairly good return, taking the season into consideration. There are no grubs in this lot, but another lot, which I planted in the beginning of November, gave plenty of signs of grubs, and never did as good as the early planted cotton. The weather was hot and dry in November and in the beginning of December, and no doubt this has a lot to do with the grub pest. In the latter end of December and the beginning of January we had about 9 inches of rain, with the result of a splendid growth of weeds. A few months before this I got some advice in regard to cultivation implements, and with the poor start, the rain, the weeds, the grubs, and that advice just about settled my late cotton. Had I been advised to get a disc cultivator instead of the spring-tooth cultivator (a farmer wants both) I and many more farmers who had the same advice would have a better result from the late planted crops. The disc cultivator makes the weeds look pretty sick after a single trip over them, and if the cotton is hilled up with the second or third trip most of the weeds are then covered, and by that time just about settled, and the moisture left in the soil for the cotton plants. The spring-tooth is a splendid implement, but it is no good when the weeds have such a good start on the cotton as they had with the last rain.

My experience this year is that cotton planted in September and the beginning of October, in a well-prepared seed-bed, and planted at the rate of 16 lb. of seed to the acre, rows 4 ft. 6 in. apart, gives the best results. I find the picking far easier and cleaner, as there are no long branches as is the case by the well-spaced cotton, and I find also that the early planted cotton plants are not attacked by the corn-grub.

No doubt, with a better class of cotton seed and the experience the growers gain more every year we can produce a first-class article, fit to compete in the world's markets.

In the meantime I would like to read the experiments of other Queensland growers. The experiences of the Queensland cotton-growers are, in my opinion, the best advice of all.

Why not give the cotton-growers illustrated lectures of the different pests? The way it is now, no farmer knows anything about the boll-weevil, pink worm, &c., &c. We had some fine coloured pictures of the sugar pests and its enemies in the "Agricultural Journal"—why not give the same of the cotton pests?

IMPACTION PARALYSIS OF CATTLE IN QUEENSLAND.

BY JOHN LEGG, B.Sc., B.V.Sc., M.R.C.V.S., Government Veterinary Surgeon, Townsville.

The term Impaction Paralysis is used to describe a disease which has been occurring for some years past in certain areas in North Queensland, and which has been responsible for considerable losses. The term is used because a study of the history of the outbreaks, together with a consideration of the symptoms and post-mortem appearances of animals dead of this disease, leads one to believe that the disease is similar to the condition known as Impaction Paralysis in Victoria. The same disease appears to be identical with the "Dry Bible" of cattle in South Australia, and the "Midland Cattle Disease" of Tasmania. The writer can find no reference to this disease in any of the departmental reports or Journals at his disposal, and it appears that the disease up to the present time has been unrecognised, hence the reason for recording it here.

Occurrence and Distribution.

So far the disease has been found to occur on two selections outside Charters Towers, North Queensland. The size of these selections is about 17,000 and 20,000 acres, respectively. Here on these two areas mortality has been high, but the disease does not appear to be confined to these areas. Reports have been received that cattle have been dying from an unknown cause in various other localities in the Charters Towers district, and a report was recently received concerning the death of cattle on one run close to the boundary of the Townsville-Clermont stock districts. The description of the symptoms given by the owners leaves little doubt that we are dealing with the same disease.

The disease occurs at all times of the year but shows little signs of spreading. The properties now infected have probably been infected for years.

Symptoms.

Cattle of both sexes and of all ages over eighteen months are susceptible. Rarely is it seen in young cattle, and it is probably more common in cows than in steers.

The first sign of anything being amiss is shown by the animal standing apart from the others and if driven lagging behind. It walks with a sort of "paddling gait" as if the feet were tender, but does not go far. The animal soon lies down and refuses to move. If left alone it may get up after some time and graze a little, but the appetite seems to be almost entirely lost. After the animal has been sick a couple of days it goes down. It may be down three or four more days, becoming weaker and weaker until coma sets in, when the beast lies on its side and death soon eventuates.

Salivation is commonly seen in the disease, and long strings of saliva hang from the mouth. In some cases the tongue is found to be slightly protruding from the mouth, and stockowners, on noticing the tongue in this condition and the animal salivating, have frequently examined the mouth expecting to find a bone stuck there.

The temperature and respiration appear to be normal, but the fæces are very scanty.

The animal does not seem to be able to drink, this really being due to paralysis of the throat. The lips are placed in the water, but the ability to swallow appears to be absent.

If a bush-bred beast is found down it appears to be quite bright in every way but cannot rise. If disturbed it makes frantic efforts to rise, but is quite unable to do so.

The disease usually runs a course of about five or six days. It may be as short as a couple of days or run into a fortnight.

Very few cases recover. The mortality must be well over 90 per cent., and it is doubtful if some of the cases which are stated to recover are really cases of the disease at all. One selector, who estimates his losses at over 500 head in the last five years, states that he has rarely seen a case recover, though he remembers one or two.

Post-mortem Appearances.

There are very few changes noted in making a post-mortem. A "quid" of grass is usually found in the mouth, lying between the teeth and the cheek, and may be extending right into the throat. The rumen or paunch is usually filled with foodstuffs, and the intestines usually appear normal. The last few feet of intestine contains several hard, mucus-coated pellets of dung. The bladder usually is empty.

Cause of the Disease.

The above is a brief description of the disease as it is found in North Queensland, and it is now necessary to discuss the probable causes. As stated previously, the disease appears to be identical with the Impaction Paralysis of Victoria, and a similar disease in other States. It is also probably allied to the Lamziekte of South Africa. The evidence in favour of such a conclusion is based on a study of the symptoms and post-mortem appearances, and on a history of the cases. The outstanding symptoms in Queensland are absence of temperature, paralysis of the alimentary tract (intestines, stomach, &c.), as shown by the inability to swallow, and the presence of a fair amount of foodstuff in the rumen, this not being passed on because of the paralysis, and in some cases by salivation and a protrusion of the tongue. This is followed by a paralysis of the limbs. These symptoms also

characterise the disease in other States. A further comparison between the two diseases will show that in Queensland, as well as in other parts, the disease occurs mostly on poor country *and where the bone-chewing habit is common among cattle.*

Research work has shown that the disease in Victoria and the Lamziekte of South Africa are both caused by bacteria, and there seems to be little doubt that, if the disease is ever made the subject of bacteriological investigation in Queensland, a similar cause will be found here. The symptoms and history of the disease all point to this being likely.

The particular bacteria causing Impaction Paralysis in Victoria belong to the group which cause "meat poisoning" or botulism. They are capable of producing very powerful toxins or poisons, which, if injected into animals, cause a disease similar to the natural disease. These bacteria have been isolated from the bones of animals which have died on the run, and the bone-chewing habit accounts for the manner in which they find their way into the systems of other animals, for, as before mentioned, the bone-chewing habit is very common where the disease is found.

Such, briefly, is the probable manner in which animals become infected. It must not be supposed, however, that all animals which die of this disease have the infection in their bones and carcasses, but all should be treated with suspicion, and it is possible that bones of cattle dead from other causes or even other animals dead on the run may be sources of infection. The toxin which is produced is absorbed from the bowel and becomes fixed in certain parts of the brain. It produces paralysis of certain nerves, especially those supplying the intestinal canal, and hence we have inability to swallow and a stasis of foodstuff in the stomach. Paralysis of the limbs follows.

Treatment.

Little can be done in the way of treatment. Nearly all cases are fatal. Statements have been made that bleeding saves many lives, though this is doubtful.

Acting on the assumption that infection is possibly caused by the chewing of bones of dead cattle, an attempt was made to clean up one selection by burning all the carcasses of animals that had died. The selection was only about 16 square miles, but, although small, it was some time before the place was even partially cleaned, seeing that over 500 head of cattle had died on this selection in about five years. The place, of course, will never be properly cleared, for it is hard to find all the bones of animals dead years ago in the patches of scrub, but an owner, who had been losing two or three head regularly per week, now reports that he has lost only five head in the last four months. Suitable licks are now being supplied to the animals.

Regarding the burning of carcasses, it might also be stated here that another selector, living next door to the abovementioned selector and on similar country, has not lost one beast from this disease. The former has made it a practice for years to burn the carcasses of animals dead on the run, whereas the latter has never done so until recently advised. It is too early yet to predict success, for there may be other factors operating to minimise the mortality at present, but prospects are hopeful.

Conclusion.

(1) A hitherto unrecorded disease in cattle has existed in the Charters Towers District for some years.

(2) This disease appears to be similar in symptoms and post-mortem appearances to the Impaction Paralysis of cattle in Victoria, and to similar diseases in South Australia and in Tasmania, and South Africa.

(3) As the disease in other parts has been proved to be due to bacteria of the type which cause "meat poisoning," investigation is required to prove whether the disease has a similar cause in Queensland.

(4) Acting on the assumption that the disease is probably caused by the animals chewing bones in which the bacteria produce their poisons or toxins, a commencement has been made by burning all the carcasses and bones on the affected runs and supplying lime to the animals in troughs. It is yet too early to state whether these measures will be successful.

(5) The mortality caused by this disease has been serious in the past. One selector reckons his losses at 500 head, and another, adjoining, at least 300 head, in the past five years. This mortality has been about equal to the natural increase, while deaths are undoubtedly occurring in other parts due to the same condition. The loss of one or two head out of a herd every few days reaches alarming figures when the aggregate is compiled.

FRUIT FLY INVESTIGATIONS.

PROGRESS REPORT OF THE GOVERNMENT ENTOMOLOGIST AT STANTHORPE.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) has made available the following report of the Entomologist in charge of Fruit Fly Investigations at Stanthorpe, Mr. Hubert Jarvis, for the months of February and March, 1923.

FRUIT FLY.

Spraying Experiments.

The continuous dry weather during the month of February proved unfavourable to fruit fly development, as was shown by the very marked decrease in infestation by it throughout this period, and the latter part of January also. Although the spraying experiments have been continued, with both Malley's Arsenate of Lead, Poison Bait spray, and also with Arsenate of Soda spray, the results obtained by me have been by no means conclusive, as the apparent immunity from attack of trees sprayed has been shared also by trees unsprayed; and this, even in relation to fruits very attractive to the fruit fly, such as "Pullers Cling" peach.

Many orchardists, however, claim the very best results from the use of Malley's Arsenate of Lead Poison-bait spray, and this spray is certainly therefore well worth persevering with next season. The fruit juice used by many in place of a certain quantity of water (*i.e.*, about 8 gallons fruit juice with 40 gallons spray) renders the bait more attractive to the fly than if this is omitted, notwithstanding this, apparently good results have, however, been obtained without the addition of fruit juice. Although careful search has been made for dead fruit flies, and for other insects, beneath trees sprayed with arsenate of lead and molasses, no insects have so far been found by me in this situation. This would seem to indicate that this mixture is more in the nature of an attractive food-bait (especially where fruit juice is added) than a fly poison. In fact, the arsenate of lead being dense and insoluble sinks to the bottom of the application, leaving droplets of sweetened fruit syrup on the leaves of sprayed trees, and these, during rain, are washed away, whereupon the deposit of arsenate of lead remaining can readily be noticed. A good method for testing the potency of this or of any other bait as a fly-poison is suggested by Illingworth in his experiments in controlling the Apple Maggot in the United States of America. In this, cheese cloth is fastened to the ground with spikes, beneath a sprayed tree, and thus any insects which succumb through its use can be easily noticed on the white surface.

It cannot yet be stated definitely just what poison to apply and how to apply it, whether in the form of a spray, or otherwise; as the work being carried out in this district in this direction is as yet in its experimental stage. It has also been noticed that the fruit of trees (Pullers Cling Peach) well sprayed with the arsenate of lead and molasses bait, have been heavily infested with fruit fly maggots.

Trap Lure Experiments.

The only lure which has met with any real success is that known as "Harvey's Lure." This lure has undoubtedly proved of use in partially controlling the fruit fly, *C. tryoni*. Unfortunately, however, this lure varies considerably in its manufacture, some samples proving much more potent than others in attracting the fruit fly. "Harvey's Lure," as sold here in Stanthorpe, will undoubtedly catch both the male and female of the Queensland fruit fly, *C. tryoni*; one week's catch at Broadwater in four glass traps resulting in 198 fruit flies and another catch at Applethorpe from three traps totalling 210 fruit flies. In this latter instance, the traps had been set for five days.

Travelling of Fruit Fly.

One experiment was made to test the efficacy of "Harvey's Lure" away from orchard trees in bush land. Three traps, after being charged with the lure, were set in a strip of uncleared land, about 70 yards wide, between two commercial orchards. The traps were about 20 yards apart, and were baited freshly with Harvey's Lure each day for four consecutive days; one fruit fly only was caught; this fly was trapped on the fourth day, and was a female specimen of *C. tryoni*. In both orchards, the fruit fly was active, on the one side in quince, and on the other in late peaches.

Throughout this uncleared strip of bushland between the two orchards, the tomato fly, *Lonchea splendida*, was plentiful, and numbers were captured in each

trap. This experiment would seem to indicate that either the fruit fly does not travel very readily under such circumstances as these, or travels high up in the air. (This experiment will be continued.)

Eggs in Trapped Fruit Flies.

The number of eggs contained in female fruit flies trapped with Harvey's Lure varies too greatly to support the supposition that these flies are trapped prior to depositing their eggs on the fruit. It is, moreover, almost impossible with our present knowledge to state how many eggs a female fruit fly will lay, and over what period she will lay them. The life period of an adult fruit fly may be anything from one to six months, and even longer. Individuals have been kept alive by me for nine weeks, under unnatural conditions (*i.e.*, in the Laboratory), and there is no reason—in view of what is known regarding this class of insect—why a fruit fly should not live during the whole of the fruit season, and (in the case of female flies) oviposit at intervals during this period.

Activity of Fruit Fly.

The fruit fly, *C. tryoni*, was, on the 23rd March, observed to be ovipositing in late apples (var. Granny Smith) at Applethorpe. The fruit flies, resulting from the eggs so laid, will probably emerge about the middle of April. Several trees are being kept for experiment. The maggot-infested fruit will be allowed to fall, and the maggots enter the soil, which will then be netted in with fine gauze, or mosquito netting. A watch can thus be kept on fruit flies emerging during late autumn, or over-wintering as pupæ, if this should prove to be their habit. This will also be tried with infested fruit in the Insectary.

Experiments are also in hand to test the depth of soil through which the newly-hatched fruit flies will penetrate upwards in their efforts to reach the surface.

Seasonal Absence of Fruit Fly.

The adult fruit fly is undoubtedly absent from the Granite Belt during the winter months (*i.e.*, from May until October). The first record of the appearance of the fruit fly, *C. tryoni*, in fruit (cherries) in this district in 1922, was on 17th November. Prior to this happening, fruit flies emerged in this office on 8th November; these flies were bred from maggot-infested late Valencia oranges, imported into this district on 18th October. It seems reasonable to conclude that a large number of fruit flies were distributed by this means, at the date mentioned and even before, as oranges had probably been coming into this district for some time prior to the discovery here of their infestation. I am of the opinion that thus the fruit fly was given then a good start, so to say, at various points throughout the Granite Belt.

From more recent observations and experiments carried out, I am inclined to think—so far as the evidence yielded by them goes—that the fruit fly does not travel far (*i.e.*, long distances), and that our greatest watchfulness should be right here in our midst. We have as yet no definite knowledge of the distance, or distances, over which a fruit fly will travel, but we do know, only too well, how rapidly it will increase and multiply from a few individuals. I would, of course, hesitate to state that the fruit fly does not travel into the district by flight; but I am strongly inclined to think that our chief danger lies in its introduction by various mechanical means, such as the importation of infested fruit, from various centres, by fruit agents and by private individuals, but also by interstate passengers on the railway.

It will greatly facilitate the inquiry here if all fruit imported into this district is (as has been suggested by Mr. Tryon) subjected to a cold storage temperature for a sufficient length of time to destroy the eggs and larvæ of the fruit fly, thus obviating all danger of fruit fly introduction by this means. The importance of care and watchfulness with respect to fruit and possible fruit fly occurrence during the months of September, October, and November cannot, in my opinion, be overestimated. A very careful inspection of every orchard in the Granite Belt area, should, particularly at this time (during the months stated) be maintained.

Packing Sheds.

A prolific source of breeding fruit fly, and one that is generally overlooked, is the "packing shed." Hundreds of maggots escape unnoticed from fruit (stored while awaiting market) and pupating in all sorts of cracks and corners, soon emerge as adult fruit flies; access by these to the orchard is generally very easily obtainable through many openings, generally present in packing sheds, and the process of its infestation goes on continuously. All fruit so stored should be shifted at least once a week, if not oftener, and all rubbish, &c., brushed up and burnt.

OTHER INJURIOUS INSECTS.

(1) Timber Borer (Diadoxus sp.).

Investigation into the cause of several fine ornamental trees of the Cyprus family dying at the Summit brought to light a boring insect associated with these trees, and probably (if not the primary injurious agent) aiding in the work of destruction.

This boring insect is a beetle of the family *Buprestidæ*, Genus *Diadoxus*. The larva or grub is about ¾ to 1 inch in length and much flattened in shape, the first segment bearing the head and strong cutting jaws being very much broader than the remaining body-segments. The beetle is about ⅝ inch to ¾ inch in length, elongated in shape. The general colour is black, broadly marked with pale yellow across the wing-cases, the under surface having a greenish tint, very noticeable when the insect is alive. The damage is done principally by the larva, which tunnels the sapwood first beneath the bark (sometimes completely girdling the tree) and finally boring a tunnel deep into the wood, in which to pupate. The mouth of the tunnel is filled with tightly-packed chewed fragments of wood through which the beetle on emerging eats its way to the open air. The native host tree of this beetle, in the Stanthorpe district, is the Black Cyprus pine (*Callitris calcarata*). This beetle has not, to my knowledge, been found attacking any orchard tree.

(2) Cabbage Moth—Plutella cruciferarum.

This little moth commonly known as a "cabbage fly" has this season caused serious loss to cabbage growers. The moth itself is about ⅜ of an inch across the wings, and so slender in build that it is often mistaken for a fly. The moth lays its eggs on the cabbage in some crevice on the leaf, or against a leaf vein, and on hatching from the egg the tiny green caterpillar at once commences to feed on the leaf surface, soon eating a small hole in the leaf-tissue; when full fed, it spins a silken bag or cocoon of rather open texture on the leaf; within the silken shelter the caterpillar turns to a pale yellowish brown chrysalis, which, in due time, gives rise to the moth. Wherever the cabbage is grown in any part of the world, this little pest soon makes its appearance. It is a very difficult insect to control, and all recommended arsenical sprays, such as Paris Green and Arsenate of Lead, &c., have failed to really control it, nor have nicotine mixtures proved effective. Early spraying, continued at weekly intervals during the first six or seven weeks of growth, with combined spray of Arsenate of Lead and Bordeaux mixture (copper sulphate and lime) might give good results. Trapping the moths at night by means of a hurricane lamp placed in a shallow tray of water to which a small quantity of kerosene has been added is helpful, and hundreds are sometimes thus caught. Experiments with various repellent substances are being tried, but no definite results have yet been secured.

PLANT PATHOLOGY.

By no means least among the trouble affecting orchard trees and vegetables are the various diseases of a pathological nature.

"Tomato wilt" has this season caused a great amount of damage and loss to young settlers. This disease, the cause of which is unknown, is at present under investigation by the Government Pathologist and Entomologist, Mr. H. Tryon.

A fungus disease, closely related to Armillaria, is responsible for serious loss among peach and plum trees in various parts of the district. Specimens exhibiting this disease are being forwarded to the officer named for identification.

SUGAR: FIELD REPORTS.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report, under date 20th April, 1923, from the Entomologist at Meringa, Mr. Edmund Jarvis:—

The Lower Burdekin During March.

A trip was made this month to the above district, Ayr being reached at midday on the 14th. The Secretary of the Pest Destruction Board, Mr. W. M. Saxby, introduced me to Mr. C. R. Crofton, president of the Shire Council, Messrs. A. H. Land, W. H. Ferguson, and other prominent growers, to whom I am indebted for cordial co-operation and, in some cases, hospitality received. Owing to the interest taken in this investigation we were able to travel over a considerable tract of

country, visiting Kalamia Mill, Rita Island, Pioneer, Jarvisfield, Seaforth, and part of Maidavale. On the evening of 16th instant, by request of the association, I delivered an address in the Ayr Shire Hall on "Control of the Grey-back Cane Beetle," which was followed by general discussion regarding those cane pests causing trouble at the present time on the Burdekin, in order that growers might have an opportunity of asking any questions occurring to them in this connection.

Effect of Drought.

The long continued dry weather has very seriously affected many plantations, the stools on which, although only 3 to 5 feet high, have turned yellowish-brown, while in some canefields the plants are already dead, or else too far gone to recover. In contrast to these drought-stricken areas it is refreshing to note the numerous stands of irrigated cane, displaying varying shades of rich green, which at present (14th March) are 6 to 8 feet in height.

The water used for irrigating purposes lies quite near the surface, often from 9 to 15 ft., and is obtained by putting down "spears," viz., iron pipes, the sides of which are pierced with ½-in. holes at distances of a few inches apart, these being covered by an outside sheathing of wire-gauze to prevent any larger particles of soil that might otherwise clog the pipe from being sucked into it.

The water is raised by a centrifugal pump to a height corresponding with that of the highest point on the land to be irrigated, and from thence conveyed to the plantation by an overhead fluming; or, if the ground be nearly level, is simply pumped into a deep channel cut along the highest headland. Many growers are of opinion that it does not pay to grow cane on the lower Burdekin unless provision be made for irrigation during dry seasons.

Ratoon Crops.

Some growers are in favour of doing away with ratoon crops altogether, believing that heavy plant crops, when forced by irrigation, have an exhausting effect on the soil, unfitting it, in fact, for an immediate production of vigorous ratoons. Possibly the leaching of certain plant-foods on much-irrigated areas might gradually impoverish such cane land. It has been noticed, too, that grubs usually do more damage to ratoons than to plant cane. Doing away with the former would mean more frequent and uniform cultivation of the soil as a whole, which, in itself, tends to increased fertility. Again, it would afford better opportunity for combating the grub pest by means of such methods as poison-baits dropped in planting drills, collecting of the grubs, &c. Further, the percentage of grub-infestation on a plantation is generally revealed when ploughing out a crop, and thus the grower being forewarned would have ample time, if necessary, to take action for control of the pest before grubs became large enough to do damage.

However, if deciding on the other hand to grow ratoons, weakly crops could, if desired, be manured in the usual way. I cannot advocate too strongly stirring of the surface soil at short intervals during the egg and first larval stage of the beetles.

White Ants Attacking Sugar-cane.

This pest appears to be working injury second only in economic importance to that caused by the grey-back beetle.

Strickly speaking, the insect in question is a termite, of larger size, however, than any occurring in the Cairns district. It tunnels in living cane-sticks, often completely devouring the interior above ground, leaving only the rind. Even when canes are bored throughout their whole length the heart-leaves at first often manage to keep green for a time, but in final stages of injury the stick dies, and when cut open is seen to be merely a hollow pipe.

Unfortunately, this pest has established itself on land that has been under cane for twenty years, so that its presence cannot be attributed altogether to the occurrence of old tree-stumps or roots, although these might in the first instance have harboured colonies of the termites. Mr. W. Payard, of Brandon, told me he lost two-thirds of a crop of Badila through ravages of white ants on an area of 18 acres, from which he finally cut 200 tons instead of the estimated yield of 600 tons. It seems he got rid of them at one time by sprinkling around their nests a bait composed of molasses and arsenic, which proved so effective that two flour bags could easily have been filled with their dead bodies.

Mr. Payard has remarked that the so-called "Soldier Ant" (*Irid-omyrmex* sp.), a very active pugnacious species which nests underground, destroys these termites, which are never found in the immediate vicinity of its communities. I was interested to observe in this connection that some termites occupying an infested cane-stick which was carried to my hotel at Ayr, were quickly discovered and attacked by a common little black ant (*Pheidole* sp.) This insect would, I feel sure, help us very materially to combat the insect in question (*Mastotermes darwiniensis* Frogg.) if introduced freely into affected canefields. This could be very simply accomplished during the flighting time of Pheidole in the rainy season while swarming of the winged males and females is taking place. In our own district, which is nearer the seaboard, these useful little ants have already obtained a footing in most cane areas, where they operate as a natural controlling factor against both the weevil-borer and large moth-borer of cane. Fumigation of the ground with carbon bisulphide, after clearing off and burning all affected cane, would destroy these termites in a wholesale manner, and at the same time by killing injurious soil bacteria improve the fertility of the land.

With a view to efficiently controlling this pest we are at present experimenting with poison baits, using for this purpose living specimens of white ants brought from the Burdekin.

Large Moth-borer.

Rita Island was visited on 16th instant, this being the locality where caterpillars of the borer (*Phragmatiphila truncata* Walk.) have been very much in evidence during past seasons. At the present time, however, little damage is being done, it being the early broods of this moth emerging from May to July that cause the chief damage. I was interested to learn from Mr. Cody that he had noticed caterpillars, which he believed to be those of truncata, boring the somewhat thick stems of "Cat-tail" grass. After a short search specimens of this grass-borer were found, but when subsequently examined proved to be those of a lepidopterous borer that does not affect sugar-cane.

As it was the wrong time of year, I was unable to obtain data regarding the possible occurrence on Rita Island of the parasite of truncata (*Apanteles nonagriæ*), a useful little braconid wasp which effectually controls this moth-borer in the Cairns district.

As a general rule, which quite possibly may hold good in the Lower Burdekin district, damage from large moth-borer seldom extends throughout the growing period, but gradually disappears when the cane is about half grown. Occasionally, however, the tops of mature sticks are bored, although not always in such manner as to cause dead-heart.

Cane Grubs.

These occurred in patches on some of the irrigated areas. On Mr. A. H. Land's selection, for example, several fine stools of cane were seen to be falling over from the effects of grub injury, the main feeding-roots having been severed, so that one could pull up a large stool with little or no exertion. The soil here was an almost black, sandy loam—ideal cane land I should say—and grubs unearthed by us were working at a depth of about 6 in. The average number obtained per stool was four, most of them being in the third stage. These large grubs are apparently those of the common grey-back cockchafer (*Lepidoderma albohirtum*); but, curiously enough, the disposition of the small stout bristles bordering the anal path differs very noticeably from the arrangement of these characteristic setæ on the anal segment of grubs of our grey-back of the Cairns district. Probably when reared to the beetle stage we shall find the Burdekin grey-back to be a variety of albohirtum, constituting, perhaps, a distinct race, which may possibly owe its origin to soil variation, environment, rainfall, and other climatic influences.

Other grubs noticed were those of the "Christmas beetle" (*Anoplognathus boisduvali* Boisd.)—termed "Gold beetle" on the Burdekin, and probably the same insect as that called "Golden beetle" by Herbert River growers—and "red-head" grubs (*Dasygnathus australis dejeani* Macl.), a cane pest of minor importance, subsisting mainly upon humus in the soil. Additional species of scarabaeidæ not yet recorded as affecting cane, occurring in this district are *Anoplognathus frenchi* and *Calloodes grayanus*, the former—which must not be confused with *Lepidiota frenchi* of our canefields—being of a uniform brilliant metallic gold colour, while grayanus, a much larger species, is dark lustrous green edged with a marginal band of golden brown.

Control Measures for Grubs.

The mechanical nature of the Burdekin soils, together with the dry weather conditions, often experienced in this district at a time when grubs are too small to materially injure the cane (February to April, during which months the average rainfall is 19.55 as against 44.78 in. during the same period in the Cairns district), point to the advisability of using soil fumigants as being the controlling factor most likely to prove effective. As far as we know at present, carbon bisulphide would meet all requirements. A few days after treatment, when the grubs were dead, the plantation could, if necessary, be irrigated with every certainty of securing a good crop. Experiments in hand with Para-dichlorobenzene indicate that this fumigant, if applied to the a week or so before flighting of the beetles, would very likely prove an efficient deterrent, it being highly improbable that egg-laden females would enter or lay their eggs in ground contaminated with an odour that would prove fatal to their offspring. Such treatment could be applied during October, before emergence of the beetles, this month being usually a dry one in the Ayr district (average precipitation 0.89 in.), which would allow time for the fumes of Para-dichlor. to spread freely in all directions.

Upon appearance of the beetles, which I presume generally emerge in November, this being the wettest month (average 12.26 in.), treated areas would still continue repellant, as ¼-oz. injections of the crystals of this fumigant do not evaporate completely until five to seven weeks after application, and even after this has taken place the soil retains the odour for about three weeks longer.

Natural Enemies.

The only species noticed during my visit was a larval specimen of the "Skip-jack" beetle (*Agrypnus mastersi*), which is predaceous upon grubs in the soil, the ground being exceptionally dry, and flowers very scarce. Mr. J. McElroy, however, told me he had often observed small wasps—which from his description I took to be males of our *Campsomeris* digger wasps—flying erratically close to the surface of the soil on cane land.

The digger wasps we are hoping to introduce very shortly from Java should prove serviceable in the Burdekin district, since the host-grubs parasitised by them in Java inhabit chiefly sandy-loam soils.

Collecting the Beetles.

With regard to collecting cane-beetles, about 6,000 quarts, principally grey-backs were paid for last season at the rate of 1s. 6d. per quart. Collecting was commenced in the middle of December, finishing up about the end of February. During last season, grubs in the Kalamia Mill area alone destroyed between 5,000 to 6,000 tons of cane. The manager, Mr. A. C. Park, thinks March is the best month in which to plant; but one cannot always be sure of the weather at that time of year. Cane is planted here mostly in May, June, September, and occasionally early in October. Mr. Land has had good results from using tops of cane planted in May.

Feeding Trees.

The chief food-plants of the grey-back cockchafer are said to be Moreton Bay fig (*Ficus macrophylla*), rough-leaved fig (*Ficus opposita*), and Moreton Bay ash (*Eucalyptus tessalaris*).

Cane Disease.

Badila cane affected by a disease apparently identical with that commonly known as "Top rot" was noticed on land belonging to Messrs. Holson and Tapolium.

This trouble seems to develop chiefly during hot weather, from February to March, often after heavy rain. The percentage of damage caused by it varies very considerably (in the present instance less than 10 per cent.). In stools harbouring the disease injury is generally confined to one or two sticks, which, strangely enough, may often be observed growing side by side with healthy canes. In advanced stages of "Top rot" the central core and heart leaves die, and when pulled out the decomposing basal portion has an offensive smell.

Up to the present this malady has received little investigation. It is said to be caused by a parasitic fungus, which it is assumed gains entrance to the plant through its roots.

Conditions favourable to development of "Top rot" are supposed to be—(1) defective drainage; (2) heavy rain during the first two or three months of the year; (3) late planting, should this chance to be followed by climatic conditions conducive to the disease; and (4) planting of varieties of cane known to be susceptible to "Top rot."

The Director of the Bureau of Sugar Experiment Stations has received the following report, under date 17th April, 1923, from the Southern Field Assistant, Mr. J. C. Murray:—

Farleigh.

At the time of inspecting this area the country was very dry, although since then fair rainfalls have occurred, though not enough as yet to give the growth sufficient impetus to yield a big crop. Numbers of farmers were planting, while others were hanging back waiting for moisture. The ground was, on the whole, in fair condition, and under the circumstances most farmers could have gone ahead with planting with a probability of a fair strike.

Cane varieties doing well are Q.813, H.Q.426, M.189, Ubo, Shahjahanpur No. 10, 1900 Seedling, B.147, N.G.16. N.G.15, H.Q.426, and Q.813 are making the best showing all through. Shahjahanpur No. 10 is doing well; in fact, this variety on a piece of rich soil is showing 7 feet of cane, and farmers would be well advised to persevere with it. Shahjahanpur No. 10 does not require a rich soil, usually doing very well on a good grade forest loam. Its immunity from frost is another factor that should commend the variety to growers on low-lying soils. Farmers are advised, when they first get this cane, to plant it on their best soil until it gets used to the land, and always adopt careful plant selection. If they do this they will find planting Shahjahanpur profitable.

Growers here are advised to go in more for green manuring; also, especially on the older soils, the use of maize as a rotation crop. They are also advised to make use of existing facilities for getting soils analysed.

Netherdale.

The cane in this area looked greener probably than any other place in the Mackay district. The land, generally speaking, has only been growing cane a short time, and consequently retains much of its virgin richness. Both scrub and forest land are mostly first-class soils, although not always accessible to the plough.

Cane varieties doing well in this district are Q.855, Q.813, Q.1121, D.1135, N.G.15, H.Q.426, and Q.970. On scrub land Badila (N.G.16) is making the best showing; but on forest soils Q.970, 813, and 855 are making excellent progress. Q.855 looks particularly well, showing in some cases hardly any sign of deterioration after the long dry spell. This variety is stooling well, with cane of good length and thickness. Q.970 also on present appearances should commend itself to growers on forest soil. Q.813 is also making an excellent showing.

Farmers are recommended to try E.K. 1, E.K. 28, and Shahjahanpur No. 10, also "Pompey."

Rainfall in the Netherdale area is probably more regular than any other of the Mackay areas. Farmers are advised to green manure as much as possible, thus preventing the soil from gradually getting poorer as time goes on.

Samples were taken from typical soils in this area, and the results of their analyses will apply fairly generally. The cane is healthy and free from pests. Grub infestations are not serious. Growers are reminded that careful plant selection is a big factor towards success.

Pinnacle.

Cane on this area has been checked, but not seriously so, by the dry weather. There should be a fair crop, unless an absolute drought strikes the district until, say, the end of April. Badila is making a good showing on the Pinnacle plains, while in other places Q.813, 1900 Seedling, D.1135, Q.970, and H.Q.426 (Clark's Seedling) are looking like cheque winners. Green manuring with cowpea is being more extensively used than hitherto. Farmers are advised to use lime in connection with this operation.

Cane pests are not causing loss at present, although on this area farmers suffer occasionally from grub infestation. Intensive cultivation is a big factor in checking the maturing process of the cane grub, as this destroys the natural habitat of the pest and retards its natural development towards the adult of the species.

In common with most other cane lands in Queensland, partially sterile patches of soil are found on many of the farms. The farmers are advised to cast animal manures on to these pockets if it is available, or try the effect of lime in proportion to the size of the sterile piece of land.

Down the river towards Gargett the cane looks green, but wants rain badly. Nut grass is a considerable pest to the farmer in this locality. Samples were taken for analyses from fairly typical Gargett and Pinnacle soils.

Marian.

This district, in common with the other areas, is suffering from want of rain. Cane here is seriously checked, but as light rains are falling now with considerable promise of continuance there should be a fair crop. There is not yet any need for undue pessimism. Excellent results have been obtained from the use of lime and green manures, and farmers are strongly advised to continue these operations.

It is probable the Q.813 is standing the dry spell as well as any variety. Malagache is suffering considerably, also 1900 Seedling. None has been stricken beyond recovery. Farmers are recommended to obtain and thoroughly test "Pompey," E.K.1, and Shahjahanpur No. 10. No serious loss is being incurred through cane pests.

A most important phase of farming on these Marian lands is sub-soiling, not inversion by deep ploughing, but disturbing the subsoil as deeply as possible to increase its capillary action in dry weather. This would greatly increase the resistance of the land during drought and, incidentally, produce heavier crops.

Walkerston.

The cane on this subarea is backward owing to the dry weather. Farmers, however, are busy cultivating and otherwise preparing for a moderately early planting. Varieties making a fair showing in face of the hard conditions are H.Q.426, Q.813, 1900 Seedling, D.1135, and M.187. Of these it is probable that D.1135 is showing the greatest hardihood. Q.813 is making a fair showing, although in one field a peculiar freakish growth of the top was noticed to be occurring fairly frequently through the cane. It appears to be the result of a shoot returning to vegetative growth after it had started to develop an arrow, and the result was a bunched and twisted top. There was no evidence of root-destroying fungi or nematodes. A big factor in causing the malformation has probably been the very adverse weather conditions.

Growers here are recommended to use green manures as much as possible, as the soil is deficient in humus. The average soil reaction is acid.

Mackay.

The cane immediately round Mackay has been severely checked by the dry weather. However, it will recover if downfalls of rain are not delayed too long. Most of the available land is planted, and some months back the crops looked remarkably promising for a heavy yield. Some of the farmers are busy breaking up and planting, but numbers are waiting for the weather to break.

Varieties holding out well include Shahjahanpur No. 10, Q.970, Q.1121, 7R.428 (Pompey), D.1135, and E.K.28. Of these it is probable that the firstnamed is showing the greatest resistance to dry weather conditions. This cane is also showing a strong degree of resistance to disease. 7R.428 or "Pompey) is showing excellent qualities, especially in the ratoons. Q.970 and Q.1121 require plenty of cultivation, and if this is carried out are very satisfactory varieties for this locality. E.K.28 is showing well, and with careful cultivation and plant selection should become a staple variety.

Summarising, the great drawback is want of rain. It is many years since the cane has had such a severe time. Areas outside the Pioneer Valley were more fortunate than those within the influence of the river in respect to showers so far fallen. Going into details, and being as brief as possible, the factors growers require to bear in mind are these—

Farleigh District.—Deeper cultivation and more green manuring; introduction and careful trying of new varieties; careful plant selection; and making greater use of the facilities provided by the Bureau for soil analyses.

Netherdale District.—Green manuring; careful plant selection.

Pinnacle District.—Liming and green manuring; careful plant selection; introduction and trying of new varieties.

Marian District.—Greater use of lime and green manures and facilities provided by the Bureau of Sugar Experiment Stations for soil analyses; careful plant selection and subsoiling.

Walkerston District.—Lime and green manures; analyses of soils and plant selection.

Mackay Area.—Subsoiling and green manuring; careful plant selection.

SUNSPOTS AND THEIR RELATION TO CLIMATE.

SEASONAL FORECASTING.—POSITION IN QUEENSLAND.

By H. I. JENSEN, D.Sc., Geological Survey.

The last twelve months constitute the severest drought period Australia has experienced since 1900-1902. It is not Queensland alone which has suffered failure of wheat crops, dying stock, heavy losses of sheep and cattle, disastrous bush fires, and similar calamities, but every State in the Commonwealth has been more or less affected by drought.

The present drought commenced eighteen months ago in Europe, the provinces of the old Austrian Empire, old Russia, Transcaucasia, and Siberia being affected. The adobe soils of Samara and Odessa are like the lands of our Western downs and Maranoa, and have a similar climate. Droughts are periodic and unavoidable.

The past twelve months in England have been the driest for twenty years. The American wheat crop is deficient. The Nile has been the lowest for two decades. Drought conditions have been world-wide. Again this year there is a second famine pending in Ukraine and Southern Russia. Plague, that usually accompanies great drought, has made its appearance in Australia in spite of precautions; violent electrical storms have visited scattered places; heat waves have been experienced, and cloud-bursts in isolated places near the coast. All these phenomena are a repetition of what occurred between 1899 and 1902.

Stock losses have been reduced in Australia in the past year, as compared with 1901-2, through the greater abundance of artesian bores, and through the more extensive distribution of prickly-pear, and crop losses have been somewhat lessened through more scientific methods of agriculture. But the season has been a severe one for the man on the land, especially occurring in a period of artificially low prices for primary products, and high prices for manufactured goods.

It is obvious that if we know the cause of these periodic droughts of world-wide extent, and if we can forecast them with some degree of accuracy, we can prevent a great proportion of the loss and suffering resulting from them.

Drought and Sunspots.

In June, 1904, the present writer contributed a paper to the Royal Society of New South Wales on the subject of the interrelation of seismic and climatic phenomena with solar conditions. It was shown that periods of world-wide drought were synchronous with sunspot minima.

Climatic Cycles.

Jevons, the great English political economist and statistician, showed that Indian famines coincided with sunspot minima, and wheat prices fluctuated in close relation with the inverted sunspot curve.

Meldrum has shown that the number of severe cyclones in the West Indies is much greater in sunspot maximum than in minimum years, while Blanford has shown that the atmospheric pressure is greater over India in years of sunspot minimum than maximum.

Wolf, a German meteorologist, and later Bruckner, first showed that climatic cycles brought a return of similar conditions in three sunspot periods—thirty-three to thirty-five years—the Bruckner cycle. The investigations of Hann, the great Austrian meteorologist, have confirmed this. Dr. Rudolph Mewes and Professor Foerster, of Berlin, said that rainfall is greater in sunspot maximum years owing to the more excessive evaporation. Professor Schuster wrote: "The difference between the average temperature in years of maximum of sunspots and years of minimum amounts to as much as 0.73 degrees C. in tropical, and over 0.5 degrees C. in extropical regions." Carpenter and Balfour Stewart found that "sunspot inequalities, whether apparent or real, seemed to have nearly the same periods as terrestrial inequalities, as exhibited by the daily temperatures of Toronto and Kew." Alex. McDowall, another well-known British meteorologist, contends that rainfall in Britain varies with the sunspot curve. Spectroscope observations in India by Blanford, Roscoe, and Balfour Stewart show that the radiation of heat from the sun is greater at sunspot maxima than at minima.

The close connection between terrestrial magnetism and solar changes was shown by Ellis, in Phil. Trans. 1880. He found that the diurnal ranges of the magnetic elements of declination and horizontal force are subject to a periodic variation, the duration of which is equal to that of the eleven years sunspot period. Violent solar disturbances are reflected in violent magnetic distrubances on the earth, accompanied by auroral displays.

The Cause of Sunspots—A Probable Theory.

Sir Norman Lockyer contended that sunspots are the result of the falling in or condensation of large volumes of cool metallic vapours of the sun's atmosphere, which form the beautiful and extensive corona that is always present round the sun in minimum years. This is a probable theory. However, it is a proven fact that there is a much more vigorous circulation of the sun's atmosphere, and consequently greater evolution of heat and electrical waves, when the spots are plentiful. Therefore, more heat and energy are radiated into space. The earth and the other planets receive more heat and energy, some of which possibly transmute lead and other minerals into uranium and radium to disintegrate later under different conditions. The earth radiates less heat into space in maximum years; consequently, evaporation is greater, climates are more equable, crops are better, the atmosphere circulates more vigorously, the moisture-laden clouds are carried further inland, and precipitation of rain is more general. A mean difference of 5 degrees C. between the average atmospheric temperatures of maximum and minimum years can account for enormous evaporation and climatic difference.

Position Reviewed.

We can now see that it is no mere coincidence that the years 1811-12, 1844-46, 1864-69, 1896-1902, and 1922 were years of severe world-wide drought. These are all sunspot minimum periods. The Nile in 1902 was the lowest on record, but this year it was nearly as low. The year 1901 was exceptionally dry in Siberia, as John Foster Fraser recorded in his travels there that year (''Real Siberia,'' p. 148). So also were the sunspot maximum years 1864, 1870-71, 1893-96 years of wet seasons in most parts of the world. The Rothesay rainfall records, the most complete in the world, show the greatest droughts to have occurred in 1822, 1855, 1887, sunspot minimum years.

Heavy rain squalls and cloudbursts occur at scattered coastal places and on oceanic islands in years of sunspot minimum. The moisture-laden clouds and the cyclonic disturbances originating over the ocean break and dissipate before the central portions of the continents are reached. Mauritius generally has the driest years when India has its wettest. Glaciers advance most in years of sunspot maximum, and retreat in sunspot minimum. Very little snow fell on Mount Kosciusko in 1902.

The Drought Question.

Red rain, fireballs, violent electrical storms, intense duststorms, and such phenomena are characteristic of sunspot minima, as are also heat waves and cold waves.

In a highly mobile fluid like the atmosphere many anomalies occur in rainfall which makes seasonal forecasting for any individual place a practical impossibility. Heavy rains occur at times in England when we are still suffering drought in Australia. But that is readily understood when one takes into consideration that England is insular, and high mountains such as those of Scotland, like the Rockies of North America and the Andes of South America, also cause cyclonic disturbances to be drawn inland even in sunspot minimum years when regions like Australia, the Deccan, South Africa, and Siberia and Russia, which have no ''chimneys'' to create a draught, are drought-stricken as long as the sunspot minimum lasts. It has also been noticed that droughts commence a year or so earlier in the one hemisphere than in the other, the position of the moon north or south of the equator accounting for this phenomenon.

The drought of the present year came a season earlier in Russia than in Australia. We are not done with it yet. The recent rains are very cheering, but entirely insufficient. To be forewarned is to be forearmed. A small and erratic rainfall cannot produce grass in sufficiency.

There seems to be little hope of science ever being able to achieve exact seasonal forecasts for small districts. The best that astronomy can yield is a general continental forecast giving an indication of the class of season to expect. This should, however, be a great aid to agriculturists and pastoralists.

Possibility of Forecasting Earthquakes.

Owing to the mobility of the atmosphere small causes, often produced by the acts of man, a bush fire, a clearing of virgin scrub, or something such, frequently cause an abnormal season for the environment.

Forecasting earthquakes and eruptions may become a practical possibility. Since solar influences in this case affect the earth's crust, an immobile medium, the effects can be foretold. But in the atmosphere minor causes bring about great variations.

Nor will it ever be possible by human agencies to make bad seasons good, or *vice versâ*, though man may be able to modify somewhat the severity of a drought in coastal districts by explosive or electrical agencies. Wragge's Styger Vortex guns were a failure, but the experiment was worth trying; and, in view of the heavy rainfall caused by artillery cannonade on battlefields, possibly the same experiment on a larger scale in a coastal district might have brought copious rain.

Hertzian waves and other electrical waves may also eventually prove useful. Further experiments on rain-making should be tried, and some good will probably eventually result, if it can only save coastal agricultural districts from severe drought.

BRITISH EMPIRE EXHIBITION.

Meeting of Agricultural, Viticultural, and Horticultural Group Committee.

The unique opportunity offered by the British Empire Exhibition to make more widely known the agricultural products and resources of Queensland is being fully seized by the Department of Agriculture and Stock, and at a meeting of the Agricultural, Viticultural, and Horticultural Committee of the Queensland State Commission of the British Empire Exhibition, held at the Head Office early in the month, plans for complete presentation of exhibits were advanced.

Attendance—

H. C. Quodling, Chairman (Director of Agriculture);
E. W. Bick (Curator, Botanic Gardens);
W. G. Wells (Cotton Expert);
H. W. Mobsy (State Organiser);
H. T. Easterby (Director, Sugar Experiment Stations);
W. G. Brown (Sheep and Wool Instructor);
J. Ward (Fruit Instructor); and
H. Hunter, Secretary.

A lengthy agenda paper had been prepared, and at the outset of the meeting the State Organiser (Mr. Mobsby) submitted his progress report. Included among the subjects dealt with were—

1. Allotment of Space for Agricultural Exhibits.

The plan of floor space submitted to the Federal Commission by the Victorian Government allowed for a total floor space of 5,436,794 square feet for all industries. Queensland's proportion of that space was 14 per cent., or in other words 757,634 square feet. There had been allotted to all States for agricultural displays a space of 18,736 square feet, and Queensland by its 12 per cent. share had at its disposal an area of 1,920 square feet.

In the plan as it stands at present Mr. Mobsby has suggested several alterations.

First of all, the original plan provides that the Wheat and Wool Trophies shall be situated right up to the front door of the building, but Mr. Mobsby's suggestion is that the Wheat Exhibit should go along with the Agricultural Exhibit, and the space so rendered vacant be occupied by an Information Bureau. As a further suggestion the Wool Trophy should be included in the Pastoral Section, and its present allotted space occupied by Trade Bureau Section. To these suggestions the Committee gave its concurrence.

2. General Character of Sectional Displays.

Discussion on this item was turned to the question of labelling exhibits. The Committee, after having given much consideration to this matter, were unanimously of the opinion that a uniform label should be adopted by all States, and it was suggested that each label should bear an outlined map of Australia showing the divisions of the several States; and the name of the exhibit should be printed on this map in lettering coloured to represent the State presenting same. The Committee delegated upon Mr. Mobsby the duty of preparing such a label for consideration by the Federal Commission.

3. Finance.

The Chairman asked each member present to furnish an approximate cost for the collection, delivery, storage, preparation, and display of the various commodities included in the Agricultural, Viticultural, and Horticultural Sections.

4. Exhibits—Collection and other Activities.

(*a*) *Wool.*—Whilst dealing with the Wool Exhibit a motion was passed to the effect that inquiries should be made of the Queensland State Commission as to the space allowed for Queensland in connection with this exhibit, and what quantity and class of wool was required, so that active steps could be taken to have a suitable exhibit procured.

(*b*) *Cotton.*—In view of the importance of Cotton to the Empire, a resolution was passed to the effect that provision be made for a representative display of Cotton in the Agricultural Section, and also that a Cotton Display be provided for on the wall space in close proximity to the Cotton Trophies. Mr. Wells promised to take up the matter of a suitable Queensland Cotton Display with the British Australian Cotton Association.

(*c*) *Sugar.*—Mr. Easterby promised to collaborate with the Colonial Sugar Refining Company and the Australian Sugar Producers' Association in connection with a suitable Sugar Exhibit.

(*d*) *Cereals.*—The Department of Agriculture has at present a large and representative collection of Queensland cereals, but provision will be made to have further specimens of this year's grain secured.

(*e*) *Grasses and Edible Shrubs.*—Whilst on this exhibit a motion was passed that the matter of the display of grasses and edible shrubs be brought up at the next meeting of the representatives of the Agricultural Departments, to be held in Sydney this month, and that consideration be given to the display of grasses on screens made to suit the design.

(*f*) *Fresh and Dehydrated Fruits.*—Mr. Ward expressed the opinion that a suitable and representative exhibit of dehydrated fruits could be obtained from the Dehydration Company now in operation at Nambour.

Pastoral and Refrigerated Products Committee.

The inaugural meeting of the Pastoral and Refrigerated Products Committee connected with the Queensland State Commission of the British Empire Exhibition was held at the Department of Agriculture and Stock, William street, on Thursday, the 26th ultimo.

The committee consists of the following members representative of the several industries comprised within this section, with Mr. E. Graham (Director of Dairying) as chairman—Messrs. R. H. Edkins and E. F. Summers (Pastoral, Frozen Meats and Meat Products); W. T. Harris, E. Turrell, and R. McWhinney (Dairying); A. H. Benson and W. Ellison (Fruit); J. Beard and W. Hindes (Poultry, Game, &c.); W. H. Mobsby, State Organiser; and M. L. Cameron, Secretary.

Space Allocation.

The committee reviewed the matter of space allocated tentatively by the Federal Commission, and it was decided that some slight modification, which would not interfere with the aggregate area of space, could be effected beneficially by common arrangement with the representatives of kindred industries in the other States.

Exhibits.

The committee discussed the procuration and arrangement of exhibits, and decided that the members of the committee should endeavour to collaborate with other representatives of the industries with a view to securing the produce necessary for the Queensland section of the forthcoming Empire Exhibition.

Several of the committee expressed the desirability of manufacturers being alive to the advantages of arranging, through the ordinary channels, for the supply of these commodities for consumption by those attending the Exhibition.

WIRE WORM IN SHEEP.

The subjoined article, abstracted from the Journal of the Department of Agriculture of the Union of South Africa, deals with the life-history of the wire worm of sheep, or stomach worm as it is known in Queensland, a parasite common enough here in many parts of the State and occasionally responsible for heavy losses, especially in lambs. In this connection Mr. John Legg, B.V.Sc., M.R.C.V.S., Government Veterinary Surgeon at Townsville, writes—

The life-history of this parasite (or *Hæmonchus cortortus* in scientific language) has been extensively studied by the Veterinary Research Staff of the South African Government, and an elaborate series of experiments with single drugs and with mixtures of drugs has revealed the fact that a combination of Sodium Arsenite and Copper Sulphate is the most effective medicinal agent that can be used in killing and removing this parasite from the digestive system of the sheep. It is this combination which is referred to in the article, and which has been repeatedly found on experiment to kill 100 per cent. of the adult parasites in the stomach.

The medicine is put up in tins, each containing 100 doses for adult sheep, and a series of graduated spoons is supplied, each holding exactly one dose for sheep of various ages. It may be given in the powder form by simply placing it on the back of the tongue with the spoon, or it can be dissolved in water with the addition of a little hydrochloric acid, and the liquid given as a drench or simply squirted into the mouth with a hypodermic syringe minus the needle. One hundred doses can be dissolved in a litre of water, with the addition of about 14 c.c. of hydrochloric acid, making the dose for one adult sheep 10 c.c. The doses are as follows:—

In Powder Form.

No. of Notches on Spoon.	For use on—	Quantity of Remedy.	Total.
One	Lamb, 2 to 4 months old	Sodium arsenite 36 mg. .. .. Bluestone 144 mg.	180 mg.
Two	Lamb, 4 to 6 months old	Sodium arsenite 50 mg. .. .. Bluestone 200 mg.	250 mg.
Three ..	Lamb, 6 to 10 months old	Sodium arsenite 75 mg. .. .. Bluestone 300 mg.	375 mg.
Four ..	Sheep, 2-tooth ..	Sodium arsenite 100 mg. .. .. Bluestone 400 mg.	500 mg.
Five	Sheep, 4-tooth and older	Sodium arsenite 125 mg. .. .. Bluestone 500 mg.	625 mg.

mg.—Milligrammes.

In Liquid Form.

For use on—	Quantity of Mixture.
Lamb, 2 to 4 months old	3 c.c.
Lamb, 4 to 6 months old	4 c.c.
Lamb, 6 to 10 months old	6 c.c.
Sheep, 2-tooth	8 c.c.
Sheep, 4-tooth and older	10 c.c.

c.c.—Cubic centimetres.

The results which have been achieved in South Africa in suppressing this parasite and the interest it has for many Queensland flock-owners, together with the experimental evidence which indicates the superiority of these drugs over all other combinations, would seem to warrant a testing of this medicinal agent under Queensland conditions.

THE LIFE HISTORY OF THE WIRE WORM OF SHEEP.

Introduction.

The wire worm of ruminants, scientifically known as *Hæmonchus contortus*, is a small thin worm which passes part of its life in the "fourth stomach" of sheep, cattle, goats, and other ruminants, including wild game such as buck. Its distinguishing scientific name "contortus" is given to it on account of the contorted or spiral appearance of the internal organs of the female. In the adult form the white ovaries of the female are rolled round the reddish intestine to form regular loops, and this gives it a spiral striping like a barber's pole. It lives by sucking blood from the mucous membrane, and from this blood its intestines derive their colour.

Post-mortem examination of an infected sheep shows the presence of the adult worms, rather over an inch in length and about as thick as an ordinary sewing needle. They are found either wriggling about in the stomach (abomasum) or in clusters round the stomach walls.

The general symptoms of acute wire worm infection are inflammation of the stomach and anæmia. This shows itself externally as a paleness of the mucous membranes of the mouth and eyes, loss of flesh and general weakness, accompanied by thirst, diarrhœa, and sometimes by a dropsical effusion (or watery swelling) under the jaw.

Lambs and young sheep are most seriously affected, but although fully-grown sheep also suffer they can sometimes harbour the worms for a long time without showing serious symptoms, provided the veld is in good condition and they obtain abundance of good food. Such *apparently healthy* adult sheep are a serious source of danger, since they keep the infection alive and, in their droppings, scatter eggs to infect the veld, and hence infect the rest of the flock.

There are six stages in the life-history of the worm—the egg, four "larval" or immature stages, and the adult. Half of these stages is passed in the stomach of the sheep, and the other half outside on the veld. The complete life-cycle may be indicated as follows:—

Adults.

Fully-grown males and females only live in the fourth stomach of sheep and other ruminants. Here they may thrive all the year round, although the degree of infestation depends upon the season. Once a sheep is infected with wire worms it may remain infected for a very long time unless measures are taken to eradicate the parasite.

The female is somewhat larger than the male, and is readily distinguished by the enlargement over the hind third of its length, corresponding to the egg-laying organs. When full size has been reached the average length is about 1 inch, and the average breadth about one-fiftieth part of an inch. The females are then fertilised by the males, and egg-laying begins.

Eggs.

The eggs then leave the stomach along with the food, pass through the intestines, and out with the droppings. The eggs are oval in shape and very small; only about one-four-hundredth part of an inch in length. The number which can be passed out by a badly infected sheep is enormous, and even an infected sheep which is still outwardly healthy in appearance may pass as many as 3,000,000 per day. The eggs then out hatch in the droppings on the veld, provided conditions of temperature and moisture are suitable. The warm wet weather of summer is most favourable, and hence spread of wire-worm infection is worst at this season. Hatching is very rapid, and may begin at once, since development of the eggs occurs even in passing through the intestines. Under favourable conditions eggs may hatch nineteen hours after being laid.

First Larval Stage.

When hatching occurs a small thread-like "larva" (immature development stage), about one-eightieth part of an inch in length, crawls out. This larva feeds on the manure in which it hatched, grows a little, forms a new skin, then moults or casts the old skin, and emerges as the second larval stage. The first larval stage is passed through in about one day.

Second Larval Stage.

At this stage the worm is about one-fiftieth of an inch in length, is very lively, and continues to feed on the droppings of the sheep. It then grows another skin, partially detaches the old skin while developing towards the third larval stage, and in this "ensheathed form" is called the "mature larva." The whole process takes less than two days, and the mature larval stage may therefore be reached about three days after hatching, provided conditions of warmth and moisture are favourable. It is in this stage that the worm is infective. Neither the egg nor the first larva can infect the animal, but at the mature larval stage the tiny worm proceeds to find a "host," *i.e.*, a sheep or other ruminant, in which to complete its development. At this stage it is about one-thirtieth of an inch in length, can live for a long time, and is migratory in habit. It leaves the medium (dung of the sheep) in which it developed, and travels up the damp blades of grass. In eating the grass the sheep takes the matured larvæ into the stomach, and in this way becomes infected.

Third Larval Stage.

The worm now commences the parasitic part of its life (first parasitic stage), casts its detached skin (remaining from the second stage), continues its evolution, forms a third skin, moults again, and emerges as the fourth larval stage.

Fourth Larval Stage.

At this "fourth larval" or "second parastic" stage, the worm commences to bore into the surface of the stomach, causing a slight effusion of blood. Within the blood clot so formed the larval worm is found. Growth continues, and a length of about one-fifth of an inch is reached in rather over a week, while at the same time differentiation of the sexes occurs. Male and female worms can then be distinguished. A fourth skin forms, is duly cast, and the young adult worm appears, the whole process being completed in about a fortnight from the time the mature infected larvæ entered the stomach.

Adult Stage.

This third parasitic or last stage of growth is completed in about another fortnight, during which time the worms grow from about a quarter of an inch in length to full size of one inch, and become sexually mature. Fertilisation then takes place, and the female begins to lay eggs, so completing the life-cycle of the worm.

Summary.

There are thus three non-parasitic stages—*i.e.*, the egg, the first larva, and the second larva—passed outside on the veld; and three parasitic stages—*i.e.*, the third larva, the fourth larva, and the adult stage (male and female)—passed in the stomach of the sheep. The time from entrance of the mature larva into the stomach until the first laying of eggs is about one month, and consideration of this period is, therefore, of the utmost importance in any system of dosing. If wire-worm is to be eradicated with certainty, dosing must be repeated at least once a month in order to prevent females from developing to the stage at which they can lay eggs and so perpetuate the infection. If they do manage to lay eggs these hatch out on the veld, develop, promptly reinfect the sheep, and restore the vicious cycle.

Influence of Season.

Since moisture and warmth are necessary for development of the eggs and early larval stages, veld infection is greatest during the warm, wet periods of the year. The infected larval stage may be reached in three days in warm weather, but only in three weeks in cold weather, and not be reached in frosty weather at all. A reduced infection of the veld may, however, prevail all the year round, especially in vleis, since the mature larva in its "sheathed from," and with its capacity for "migrating" or wandering along moist surfaces will live for a long time. Exposure to direct sunlight or drought will kill it, but under such adverse conditions it returns to the soil to hide, only coming out again to crawl up the grass in dull, damp weather. If, of course, the worms never find a "host"—*i.e.*, sheep or other ruminant—they finally die a natural death. The two practical points to remember are—

(1) That an infected pasture may remain infected for at least a year, and that all sheep grazing on it during this time are liable to become infected.

(2) That a living sheep spreads the infection so long as adult wire-worms are present in the stomach.

Eradication of Worms.

In order to suppress the wire-worm plague, it is therefore necessary to kill the wire-worms in the stomach of the sheep and to clear the farm of mature larvæ. The first task can be accomplished by using the Wire-worm Remedy supplied by the Division of Veterinary Education and Research (this remedy consists of a combination of arsenic and desiccated copper sulphate). The second is more difficult, and takes longer to accomplish. One method would be, of course, to keep away all animals which act as hosts (sheep, cattle, goats, buck) for at least a year, and so leave the larvæ to die a natural death, but this method is not feasible in ordinary farming. The other method is to allow the sheep to pick up the larvæ in grazing, but to kill them off in the stomach before they reach the egg-laying stage. Since the parasitic worm takes from three weeks to a month to reach sexual maturity, the treatment involves regular dosing at least once a month, especially during the rainy season. If this is done, no eggs are laid, no fresh infection on the veld occurs, and the larvæ which are not picked up by the sheep die in time. The farm is then clean, and provided no further infection is brought in from other areas dosing is no longer necessary. Although the possibility exists that the infection may be kept alive by ruminants other than sheep (cattle, buck), experience has shown that these cattle are only rarely infected, and hence systematic dosing of sheep and goats is generally sufficient to eradicate the disease. In the rare cases in which infected buck, with which dosing is impossible, do keep the infection alive, periodic dosing of the sheep and goats may have to be continued indefinitely. It must be remembered that the Wire-worm Remedy is a cure and not a preventative. It kills the worms in the stomach, but, of course, passes out of the stomach with the food, and hence cannot prevent reinfection. There is, therefore, no practical way of preventing reproduction of the worms except by killing them off regularly once a month until the source of infection on the veld itself disappears.

It may be added that the directions for use of the Government Remedy are arranged to eradicate worms as completely and quickly as possible without danger of poisoning the sheep. They are, therefore, more drastic than most remedies on the market, especially in regard to preliminary starvation treatment. Even if used under the less drastic conditions advertised for other remedies, however, the Government Remedy is as effective as any of them.

Analogy with Tick Eradication.

The principle underlying these recommendations will perhaps be clearer if it is compared with the principle of eradication of ticks. Ticks cannot be prevented from attaching themselves to the stock, and cannot be killed out in the grass in any feasible method. The stock, therefore, collect the ticks, but if the stock are regularly dipped the collected ticks are either destroyed or do not lay fertile eggs, and hence do not perpetuate the infestation. The ticks which do not attach thmselves to stock die a natural death in course of time, and hence after a year or two of regular dipping the farm becomes clean. In the same way the sheep collect the wire-worm larvæ, and the dosing destroys them. In the case of ticks, short intervals between dippings, three to fourteen days according to the kind of ticks, are necessary, because the ticks breed very quickly after attaching. In the case of wire worms an interval of three to four weeks between dosings is sufficient to prevent breeding. If the dosing is systematically carried out the wire worms will be rapidly reduced to neglible numbers, just as ticks are reduced by dipping.

Diagnosis by Means of Culture.

A practical and easy method of finding out to what extent sheep are infected with wire worms, even before they show the ill-effects of the infection, is to cultivate the eggs from the droppings and observe the migrating larvæ. Every farmer can do this for himself by collecting fresh moist droppings from the suspected sheep, placing them in a glass jam-jar, placing the jar in a comfortably warm cupboard, and watching events from day to day. Provided the droppings have been sufficiently moist, a fine dew deposits on the sides of the glass, and from the fourth day onwards the larvæ, which have developed from the eggs passed out by the sheep in the droppings, begin to migrate, and form slimy white tracks ramifying over the surface of the glass. If the glass is now exposed to strong light, the larvæ will be observed to return to the droppings, and enter them again, provided they are still sufficiently wet. It should be added that "sour fæces" are unsuitable for culture, but that in most cases the experiment is successful, instructive, and useful.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RETURNS FOR MARCH, 1923.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			lb.	%	lb.	
Yarraview Village Belle	Guernsey ...	19 Feb., 1923	651	5·6	43·09	
Royal Mistress ...	Ayrshire ...	25 Nov., 1922	720	3·5	29·40	
Bellona	,, ...	30 Aug., ,,	570	4·5	29·40	
Pretty Maid of Harelmar	,, ...	11 Sept., ,,	600	4·1	28·80	
Lady Peggy ...	,, ...	18 Nov., ,,	720	3·4	28·50	
College La Cigale	Jersey ..	10 July, ,,	410	5·5	26·65	
College Meadow Sweet	Friesian ...	18 Sept., ,,	560	3·4	26·10	
Confidence... ...	Ayrshire ...	13 Aug., ,,	570	3·9	26·10	
Yarraview Snowdrop	Guernsey ...	1 Sept., ,,	420	5·0	24·60	
College Mignon ...	Jersey ...	20 Nov., ,,	450	4·6	24·30	
Fair Lassie ..	Ayrshire ...	1 Sept., ,,	480	4·3	24·0	
Thyra of Myrtleview	,, ...	22 Aug., ,,	510	3·9	21·90	
Nina	Shorthorn...	12 Jan., 1923	600	3·1	21·60	

PROPOSED EGG BOARD.

A notice has appeared in the "Government Gazette" of the intention to declare that eggs (exclusive of those used for breeding purposes) produced in all that portion of Queensland lying east of a straight line from Bundaberg to Goondiwindi, and which are produced by persons keeping 100 or more hens, turkeys, ducks, geese, or guinea-fowls (including the males), shall be for two years from the 1st June, 1923, a commodity under "*The Primary Products Pools Act of* 1922," and to constitute an Egg Pool for such eggs. The persons who shall be eligible to vote on any Referendum or Election in connection with the said Pool prior to the 1st July, 1923, shall be persons keeping on the 1st May, 1923, at least 100 fowls as described above. Persons eligible to vote on any future Referendum or Election in connection with the Pool shall be persons who at any time during the preceding six months prior to the date of such Referendum or Election kept 100 or more fowls as above.

A notice is also being issued calling for nominations for the proposed Egg Board. These nominations will be received by the Under Secretary, Department of Agriculture and Stock, Brisbane, up to the 14th May, 1923. The Board will consist of five members, and each of the following districts shall return one representative:—

No. 1 District.—The Petty Sessions Districts of Bundaberg, Gin Gin, Mount Perry, Eidsvold, Childers, Maryborough and Biggenden, Gayndah, Tinana, Gympie, Kilkivan, Wienholt, Nanango, Maroochy, Caboolture, Woodford, and Kilcoy.

No. 2 District.—The Petty Sessions District of Redcliffe, and that portion of Brisbane north of the Brisbane River.

No. 3 District.—The Petty Sessions Districts of Wynnum, Cleveland, and that portion of Brisbane south of the Brisbane River.

No. 4 District.—The Petty Sessions Districts of Logan, Southport, Nerang, Beaudesert, Goodna, Ipswich, Lowood, Esk, Marburg, Harrisville, Dugandan, Rosewood, Laidley, Gatton, and Helidon.

No. 5 District.—The Petty Sessions Districts of Toowoomba, Clifton, Pittsworth, Allora, Warwick, Killarney, Inglewood, Texas, Goondiwindi, Stanthorpe, Highfields, Crow's Nest, Oakey, Goombungee, Cooyar, Jondaryan, Cecil Plains, and Dalby.

Each nomination must be signed by at least ten producers of eggs as above.

A roll is being compiled of persons eligible to vote on any matter in connection with the proposed Egg Pool, but in order to insure their names being on such roll, keepers of 100 fowls or more as above are invited to send their names at once to the Department of Agriculture and Stock.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MARCH IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING MARCH, 1923 AND 1922 FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Mar.,	No. of Years' Records.	Mar., 1923.	Mar., 1922.		Mar.,	No. of Years' Records.	Mar., 1923	Mar., 1922.
North Coast.	In.		In.	In.	*South Coast*—continued:	In.		In.	In.
Atherton	8·97	22	11 09	5 91					
Cairns	18·01	41	21·03	11·24	Nambour	9·52	27	3·71	0·92
Cardwell	16·27	51	7·27	9 06	Nanango	3·37	41	4·65	0·60
Cooktown	15·09	47	29·91	19·55	Rockhampton ...	4·87	52	0·55	1·59
Herberton	8·34	36	5·98	5·91	Woodford	8·13	36	4·64	1·39
Ingham	16·08	31	5·79	11·14					
Innisfail	25.86	42	22·51	15·74					
Mossman	18·86	15	18·14	23 08	*Darling Downs.*				
Townsville	7·76	52	0·38	1·34					
					Dalby	2·72	53	1·53	0·48
Central Coast.					Emu Vale	2 62	27	0·61	1·10
					Jimbour	2·63	35	2·70	1·57
Ayr	7·20	36	0·63	1·01	Miles	2·73	38	0·35	0·85
Bowen	5 92	52	1·11	2·11	Stanthorpe ...	2·76	50	2·13	1·20
Charters Towers ...	3·77	41	0·50	8·12	Toowoomba ...	3·89	51	1·33	0·94
Mackay	12·42	52	4·73	2·15	Warwick	2 66	58	1·70	0·22
Proserpine	12·31	20	4·75	4·33					
St. Lawrence ...	5 97	52	0·17	0·15	*Maranoa.*				
South Coast.					Roma	2·81	49	1·76	0·55
Biggenden	4·17	24	2·87	0·65	*State Farms, &c.*				
Bundaberg	5·44	40	0·48	1·07					
Brisbane	5·79	72	2·34	2·01					
Childers	5.02	28	0·68	0·54	Bungeworgorai ...	1·64	9	0·56	0·26
Crohamhurst ...	11·69	30	6·18	2·17	Gatton College ...	3·41	24	2·19	0 03
Esk	4·83	36	5·85	0 98	Gindie	2·81	24	2·62	0·80
Gayndah	3 27	52	1·88	1·53	Hermitage ...	2·51	17	0·52	0·36
Gympie	6·26	53	2·50	2·01	Kairi	7·90	9	...	7·15
Glasshouse Mts. ...	9·25	15	5·19	1·54	Sugar Experiment Station, Mackay	11·53	26	2·82	1·59
Kilkivan	4·03	44	1·79	1·87	Warren	2·74	9	...	1·01
Maryborough ...	6·30	52	2·41	0·80					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for March, 1923, and for the same period of 1922, having been compiled from telegraphic reports, are subject to revision.

J. H. HARTSHORN,
Acting State Meterologist.

DEPARTMENTAL APPOINTMENT.

J. P. Donlevy, of Cairns, has been appointed Government representative on the Cook Dingo Board during the absence of the Government representative, Mr. A. H. Scott.

The resignation of R. M. Troy, as millowners' representative on the Gin Gin Local Sugar Cane Prices Board, has been accepted, and Mr. N. E. Annand has been appointed in his stead.

Police Constable J. Topp, of Wyandra, has been appointed an inspector under "*The Slaughtering Act of* 1898."

THE COMMERCIAL PICKING, GRADING, AND PACKING OF APPLES, PEARS, PEACHES, TOMATOES, AND PLUMS.

By WM. ROWLANDS, Packing and Grading Instructor, Queensland.

The above-mentioned fruits are grown in such large commercial quantities in so many States that it is not profitable to produce or send to market any fruits unless they are of good shipping quality. A few purchases of the fruits mentioned that are immature or otherwise unsatisfactory will turn the consumer to other fruits. Therefore growers should use every endeavour to keep the markets free of fruits of undesirable

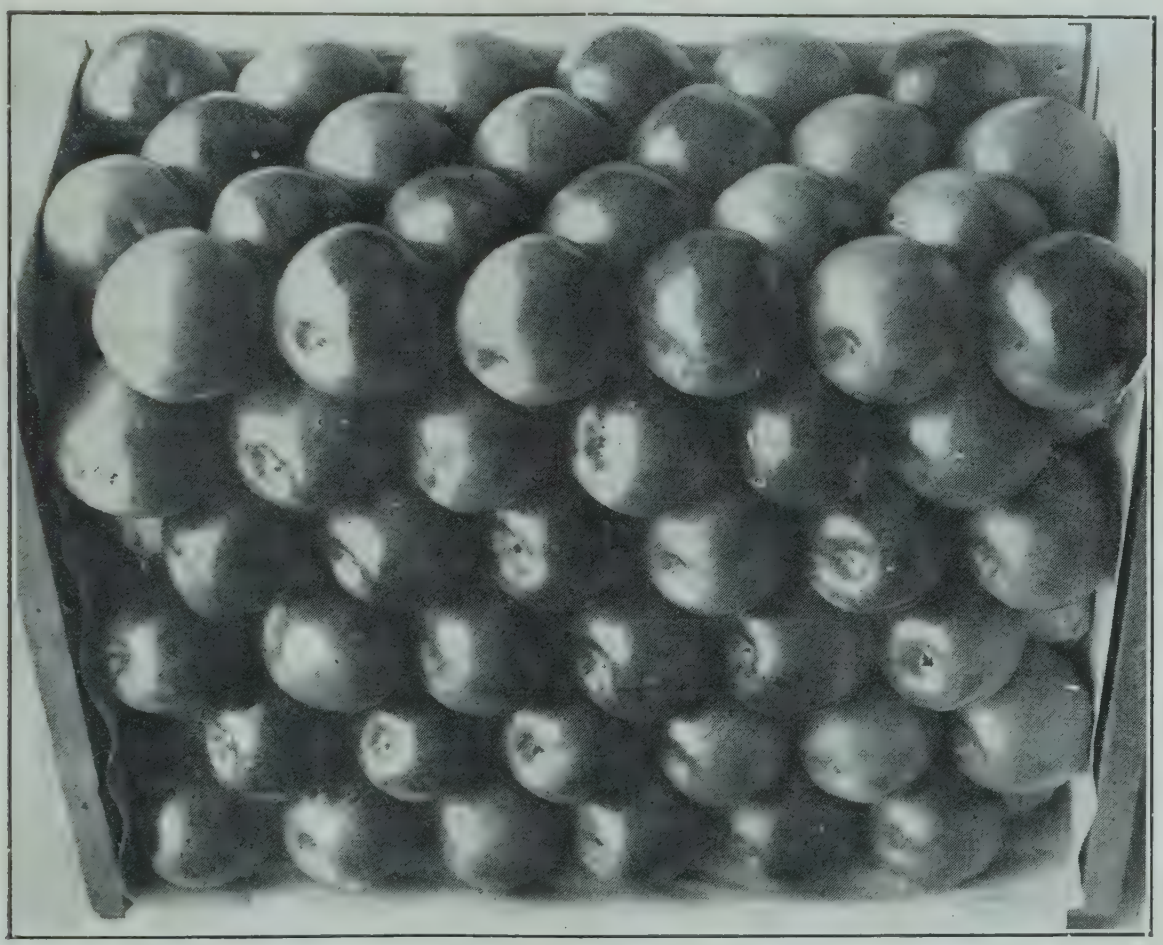


Fig. 1.—Well-packed Case of 2¾-inch Apples, Showing Top and Side View. Note Part of Apple Showing at Side.

variety and quality. This bulletin is designed to aid growers and shippers in preparing their fruits for markets in such a way that they may realise higher average returns with fewer losses. Growers must bear in mind from the start that it is absolutely necessary to grow and produce fruits of good quality to compete against other States. Readers should study the illustrations thoroughly.

DEMAND FOR WELL GRADED AND WELL PACKED FRUIT.

Experienced produce merchants will agree with the statement that any fruit or vegetable of desirable variety, well grown, carefully harvested, properly graded and sized, is more than half sold. On the contrary, fruits poorly grown or carelessly prepared for market are always disposed of under a decided handicap. The appearance of an article of fruit is the first point noticed by the consumer, the retailer, and the wholesaler. If the product is exhibited in dirty or damaged cases, if it is slack-packed, decayed, or not sized or graded for quality, the best "trade" will pass it by for other shipments of better quality and appearance. Years of observation on the part of those closely connected with the fruit business warrant the statement that markets are rarely glutted with fruits of first-class grade, size, and appearance. High-grade products will sell, and usually at a profit to the grower, even when ordinary or poor grades are going to waste. This situation is to be expected, since it is natural for both dealers and consumers to want the best. On a normal market the higher grades may be out of reach of many on account of the price, but when a market is glutted and the quotations drop, the "trade" will become more and more discriminating, the well-graded and well-packed will be taken and the inferior stock left or sold at a sacrifice. Wholesalers and retailers know that the higher the quality of their goods the less the chance of loss in deterioration, time, and customers. Every grower and shipper of fruits should realise that when profits accrue from their business, they generally are due to the marketing of produce of good quality and appearance. In certain years of scarcity poor fruits may be disposed of at a profit, but in the great majority of cases they are a source of loss to all persons engaged in handling them.

CARE IN HANDLING.

Many growers realise that care in handling during picking, grading, packing, and carting is necessary if they are to obtain profitable results, while others, either through ignorance or because of carelessness or indifference, subject their fruit to early decay and spoilage through needless rough handling during these operations. A great deal of rough handling is due to lack of knowledge of what constitutes careful handling. It is not generally realised that it is necessary to preserve the skin of any fruits in a sound, unbroken condition, "especially when fruit is intended for cool storage." Growers must awaken to the fact that it is their business to see that their pickers, packers, graders, and carters each do their share to eliminate rough handling. The writer has noticed that growers and others when carting use a full case of packed fruit for a seat. This is a bad practice and should be avoided. The case so used may be opened by the agent to sell the whole of that particular consignment. In Launceston recently a case was opened to show a grower the result of such treatment, and it was found that 90 per cent. of the fruit therein was badly bruised, while the remainder of the load was perfectly sound.

ORCHARD BOXES.

The use of orchard boxes cannot be too strongly insisted upon in harvesting fruits of any kind. Shipping cases, when used for handling fruit in the orchard, almost necessarily become soiled and warped, and a soiled case is a cheap case, notwithstanding the grade of fruit that may be in it. The writer suggests the use of second-hand benzine and petrol cases for this purpose. These cases, if banded with hayband wire, will last for several years; they are much lighter and also much cheaper to the grower (wiring benzine cases being good employment for pickers on wet days). One Tasmanian orchardist during the 1918 season made 500 cases as suggested, and after four seasons' picking still has the original 500, not one being broken. (See Fig. 2.)

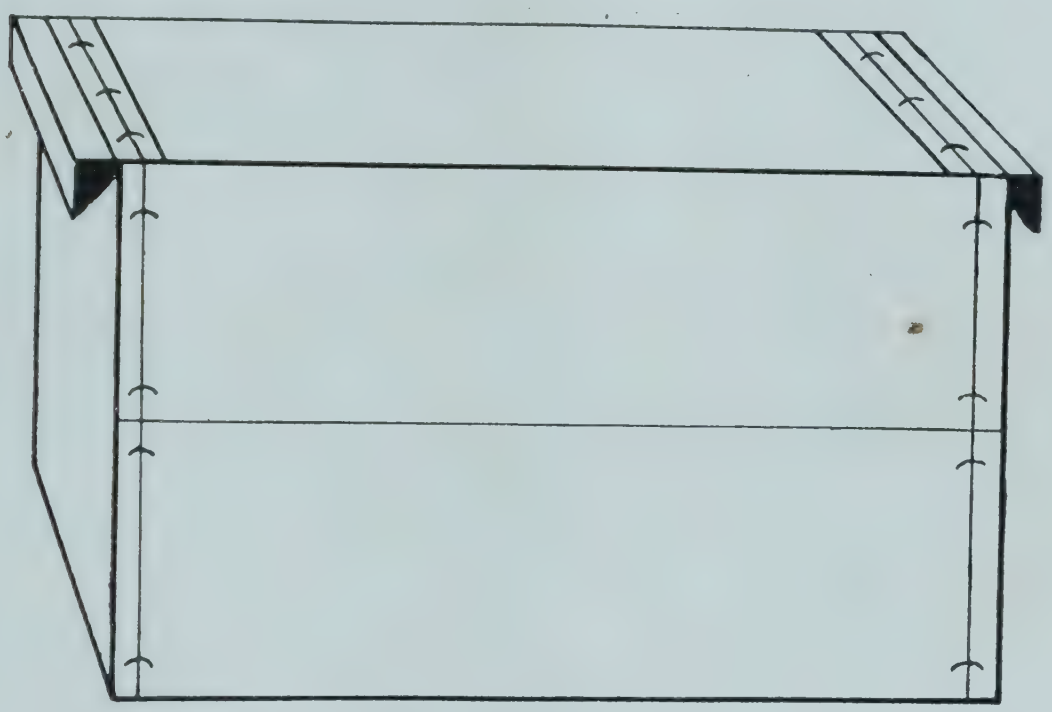


FIG. 2.—ORCHARD BOX.

APPLES.

Picking.

An all-important matter to be first considered is the correct time for harvesting. The proper picking of apples is a most important operation in preparing this fruit for market. The best judgment must be exercised in selecting apples in the right stage of maturity to carry properly. Experience on the part of the growers and pickers is necessary if good results are to be obtained. As a matter of fact, it is difficult to make a rule that will state just when any particular kind should be picked, for so much depends on such things as variety and district and seasonal conditions; and directions that may apply in one district will not necessarily hold good in another. Colour of the fruit is taken by some growers as a deciding factor in determining when to pick, while others rely on the falling of the fruit from the trees. In order to pick apples at the

proper stage of maturity, orchardists must learn the traits and characteristics of each variety in his own particular district. For example—the Gravenstein has a tendency to fall before ripening; on the other hand, if left on the trees too long it may develop core-rot. Jonathans fall at the time of ripening, while Sturmers, Croftons, and Tasmas may be left on the trees several weeks after most other varieties have been picked.

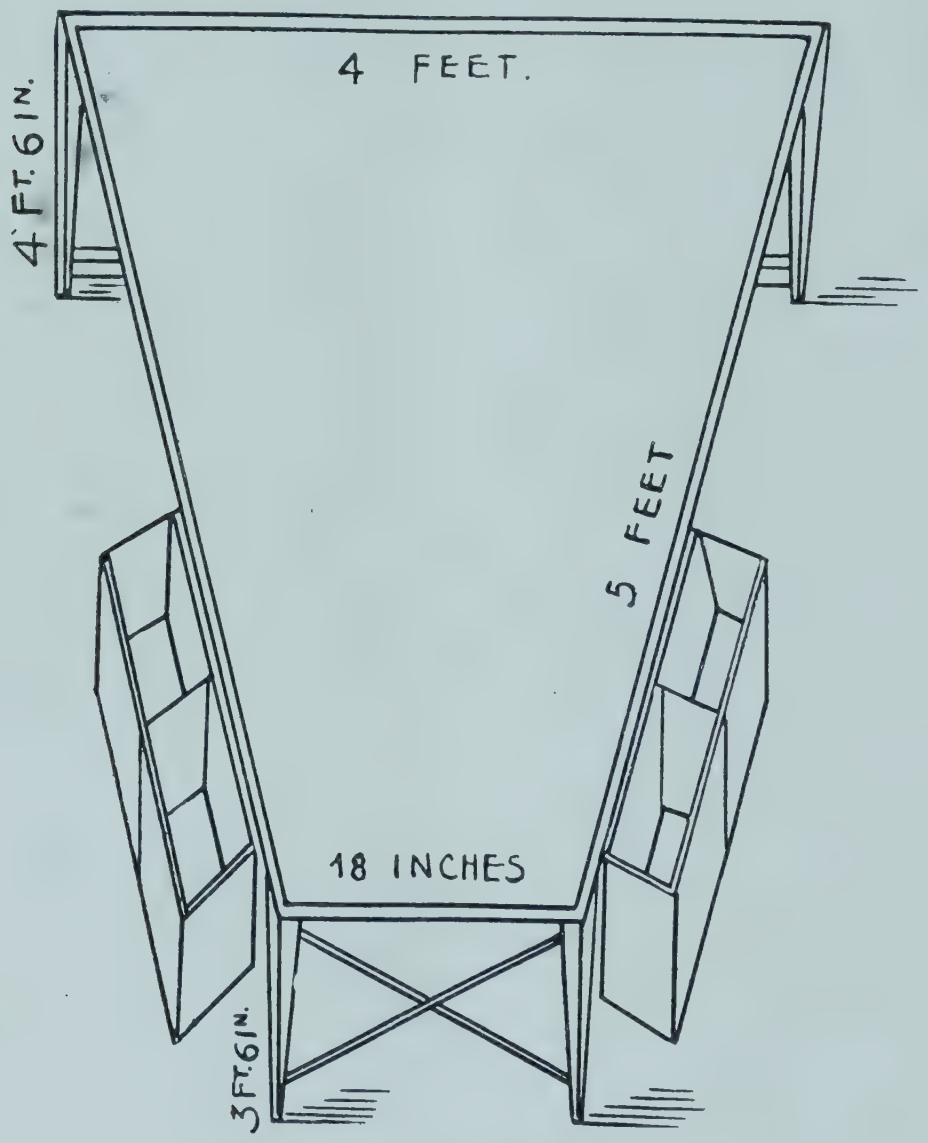


FIG. 3.—ORCHARD BIN.

Number of Pickings.

Many growers strip their trees when picking (that is, pick all the fruit, large or small, mature or immature). Growers should realise that a crop of fruit is not to be treated like a wheat or hay crop by making a clean sweep at picking time; instead, they should take the fruit as it matures, thereby getting a 10 to 20 per cent. better average and simplifying grading and sizing. The more prosperous and experienced orchardists make three to four pickings of apples.

Damage During Picking.

The writer is of the opinion that 50 per cent. of damage to fruit occurs during picking, and suggests to growers who employ pickers to demonstrate to them how to pick at the beginning of each season, and to impress on them the necessity for careful handling.

Hints to Pickers.

Do not squeeze fruit when picking.

Do not drop fruit into picking bags or buckets.

Do not empty fruit from your bags or buckets into cases roughly.

Do not pick up windfalls and mix with freshly-picked fruit.

The picking up of windfalls should be a separate operation.

Always place the orchard boxes on the shaded side of the tree when full. A few hours in the sun after picking is not good, especially when fruit is intended for cool storage. This is very important.

Sizing and Sorting.

Perfect sizing is essential if perfect packing is to be done.

There are several methods of sizing, by machine and by hand.

Of recent years great improvements have been made in the mechanical sizers. There are several makes of these machines in use in Australia, including the Ideal, Lomas, and the Nelson. It is not our purpose to recommend any particular one. The great essential, however, is to size properly, whether by hand or machine. If apples are sized into four dimensions—namely, $2\frac{1}{4}$ inch, $2\frac{1}{2}$ inch, $2\frac{3}{4}$ inch, and 3 inch—they will meet all requirements for the export trade. Larger or smaller should not be sent to distant markets. In determining the size of apples, they are measured from cheek to cheek, not from calyx to stem. When sizing is done by hand, rings or wooden gauges cut to the required sizes may be employed, not necessarily for every apple, but when the person sizing is in doubt. Apples that drop through the $2\frac{1}{2}$-inch ring and remain on the $2\frac{1}{4}$-inch ring are $2\frac{1}{4}$; those remaining on the $2\frac{1}{2}$-inch ring after passing through the $2\frac{3}{4}$-inch ring are $2\frac{1}{2}$-inch apples; and those passing through the 3-inch ring and remaining on the $2\frac{3}{4}$ inch are $2\frac{3}{4}$-inch apples. Thus it will be seen that nearly a quarter of an inch variation is allowed. If one-size apples are $\frac{1}{8}$ of an inch under or over the dimensions above, it will, of course, make much difference in packing. When possible, sizing and packing should be treated as two distinct operations, and performed by different and specially trained workers. The persons sizing should not only size, but throw out all undesirable specimens. The packers should be free to give attention to securing a pack of standard quality which is both firm and attractive. Sizing operations would be simple if growers made several pickings from each tree as suggested on page 390, under the heading of "Number of Pickings."

Packing.

We can look back over past years and note the evolution of packing, from the old "rough" pack to the "square" pack, and lastly to the "diagonal" pack, which is recognised as the standard throughout prosperous fruitgrowing centres. It has been the object in other States to simplify the method of packing and lessen the variation of packs. At the present time standard "diagonal" packs are exclusively used throughout New Zealand and America. Growers and packers must, therefore, bear in mind that badly-packed apples placed upon the larger markets will come into direct competition with those from other States and New Zealand, where packing has attained a degree of efficiency and excellency difficult to surpass.

In Tasmania there are two packs, known as the "square" pack and the "diagonal" pack. The diagonal is the pack recommended as the only pack to suit our dump case. The name "diagonal" is derived from the fact that the rows of apples resting cheek to cheek always produce diagonal lines across the layers to which they belong, and when the case is opened—whether at top, side, or bottom—the same effect is produced. To pack all commercial apples only three distinct packs are necessary, embracing six different sizes (that is, if sized to the $\frac{1}{4}$-inch); thus it will be seen that any deviation from the three packs mentioned is unnecessary. These three packs are known as the 3—2, 2—2, and 2—1. The 3—2 pack is for medium or small apples, and the 2—2 is for $2\frac{1}{2}$-inch apples up to and inclusive of $2\frac{7}{8}$ inch. The 2—1 pack comprises 3-inch, $3\frac{1}{4}$-inch, and $3\frac{1}{2}$-inch. It may be mentioned, however, that sometimes, owing to the ends of the case not having shrunk to the required size—viz., $8\frac{2}{3}$ inch —$2\frac{1}{2}$-inch apples may pack 3—2, but this is not often the case. However, with a little commonsense on the part of the packer, he will soon discover if 3—2 or 2—2 is needed. Figs. 9 10, and 11 illustrate the method of determining the different packs. It cannot be too strongly emphasised that no benefit is gained and only confusion caused by attempting any other packs than the three mentioned above. All these are diagonal packs. By this is meant that the apples are arranged in rows, with each apple touching the one next to it. Another distinction between the diagonal and square packs is that in the diagonal the apples are placed over the spaces between the specimens below, and not directly on top of them, as in the square packs. In order to be a successful packer, it is necessary for the beginner to follow closely the instructions here. Any deviations are unnecessary, and will lead to disappointment and confusion. The same will apply to those who have endeavoured to master the art either without proper tuition or along less up-to-date lines. Experience has proved that the diagonal pack makes it possible to pack firmly practically any sized apples, resulting in a better commercial pack from all viewpoints. Bruises are reduced to a minimum, the pack is firm and elastic and will not shift, and a more attractive article is placed on the market, commanding a more ready sale. It is not recommended to bulge-pack the dump case.

2—1 Pack.

This pack is for large apples, three of which are too large to fit across the case side by side (see Fig. 9). It includes three sizes—3-inch, 3¼-inch, and 3½-inch. Fig. 4 illustrates the correct method of commencing the pack of a flat shape variety. Fig. 8 applies to conical-shaped varieties. In both the illustrations mentioned it is necessary to note the placing of apples 1 and 2. The placing of the first two apples in each layer will determine the spacing necessary to bring five layers to the correct height

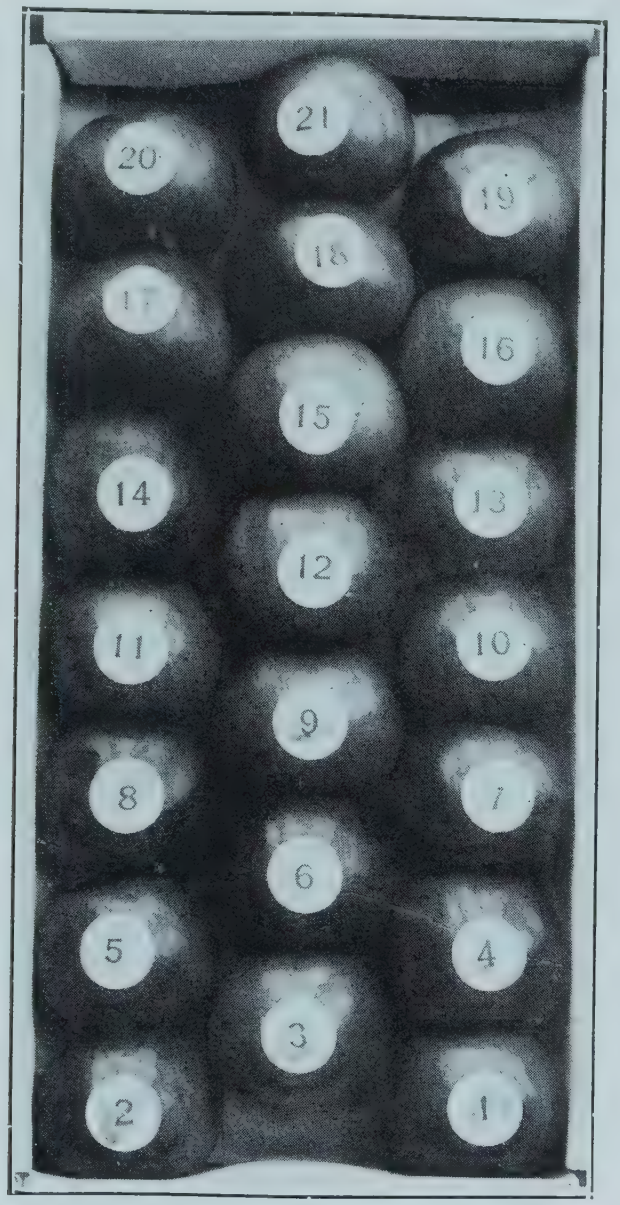


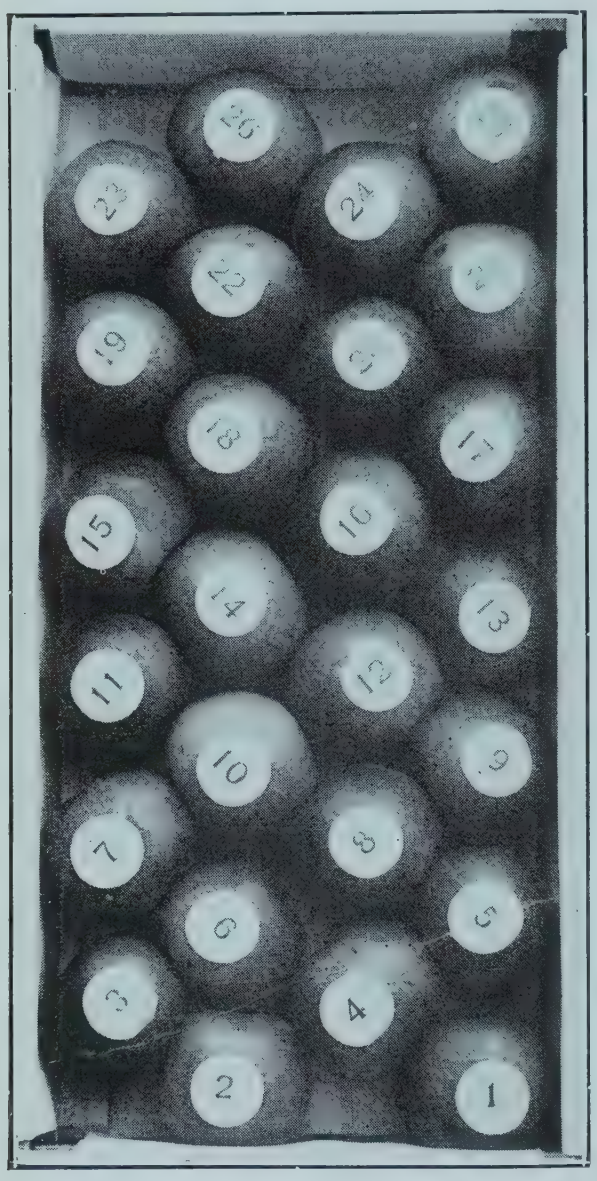
Fig. 4.—3-inch. Note that Apples Nos. 1 and 2 are Placed Flat Against End of Case.

in the case. (Packers must remember that 3-inch apples include all larger sizes up to 3¼-inch, similarly 3¼-inch allow a variation up to 3½-inch—a quarter of an inch variation.) To commence this pack start as shown in Figs. 4 and 8, which show completed layers of flat and conical-shaped varieties. The second layer is commenced with one apple placed over the space between the first two in the first layer, the third

layer is identical with the first, the fourth the same as the second, and the fifth and last layer is similar to the first and third layers. Experience has shown that all apples packed in the Tasmanian dump case pack the correct height in each case if packed on the cheek.

2—2 Pack.

Generally speaking, the 2—2 pack is the most important, because it embraces those sizes which are successful export sizes—viz., $2\frac{3}{4}$-inch and



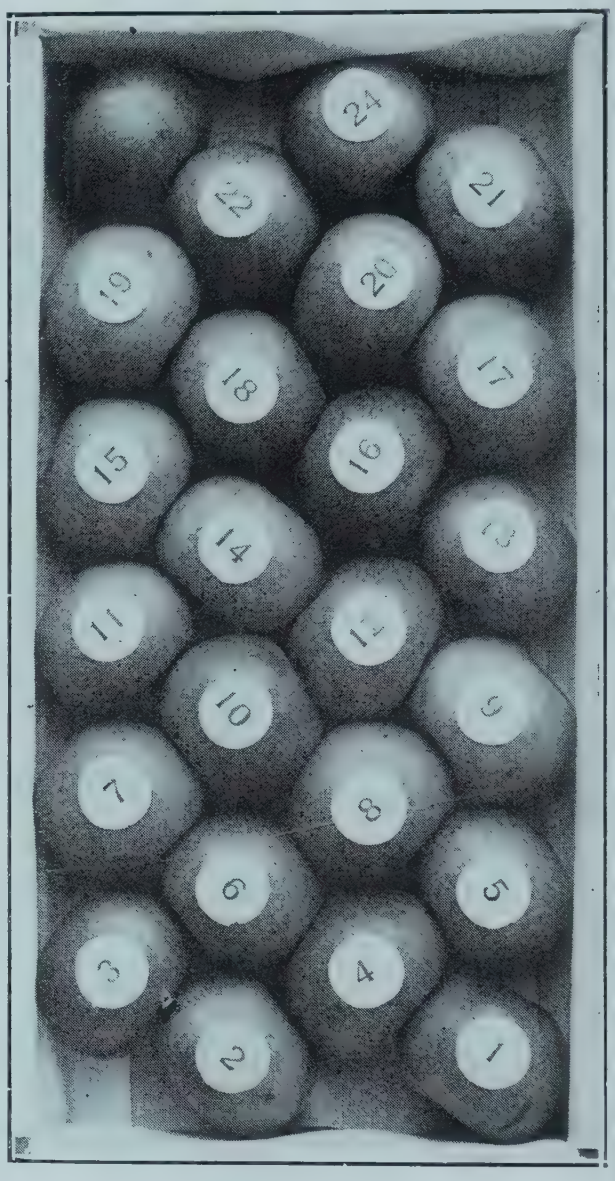


FIG. 5. FIG. 6.

FIG. 5.—$2\frac{1}{2}$-INCH. NOTE THAT APPLES NOS. 1 AND 2 ARE PLACED FLAT AGAINST END OF CASE.

FIG. 6.—$2\frac{3}{4}$-INCH. NOTE THAT APPLES NOS. 1 AND 2 ARE PLACED AT AN ANGLE WITH END OF CASE.

$2\frac{1}{2}$-inch apples. It must be borne in mind that this pack is used when only three apples of the same size fit loosely side by side across the box and the fourth will not fit in. If four fit in side by side the pack will, of course, be 3—2 (see Fig. 10). This pack is commenced as shown in illustration (Fig. 5). Take particular notice of the placings of

apples one and two. Readers will note that the first two apples, 2½-inch (Fig. 5), are placed flat against the end of the case, while in Fig. 6 (2¾-inch) the first two are placed at an angle, each successive layer is placed the same until the case is finished, remembering that apples are placed in the spaces of previous layers. Placing the first two apples as pointed out in Fig. 5 brings the remainder of the layer closer together, with the result that six layers of 2½-inch apples fill the dump case to a nicety. The procedure for the 2¾-inch apples differs slightly from the 2½-inch, as will be noted in Fig. 6. The first two apples are placed at an angle, as shown in the Fig. 6. By placing them at this angle the spaces between the apples are increased, thus allowing six layers of 2¾-inch apples to be packed conveniently. If the instructions are followed no difficulty will be experienced in making a good finish of either the 2¾-inch or 2½-inch sizes of apples.

3—2 Pack.

The 3-2 pack is used mostly for 2¼-inch and 2-inch apples. Two-inch apples are rarely exported, therefore I will deal mainly with 2¼-inch. Readers are referred to illustration (Figs. 7 and 9), which shows the

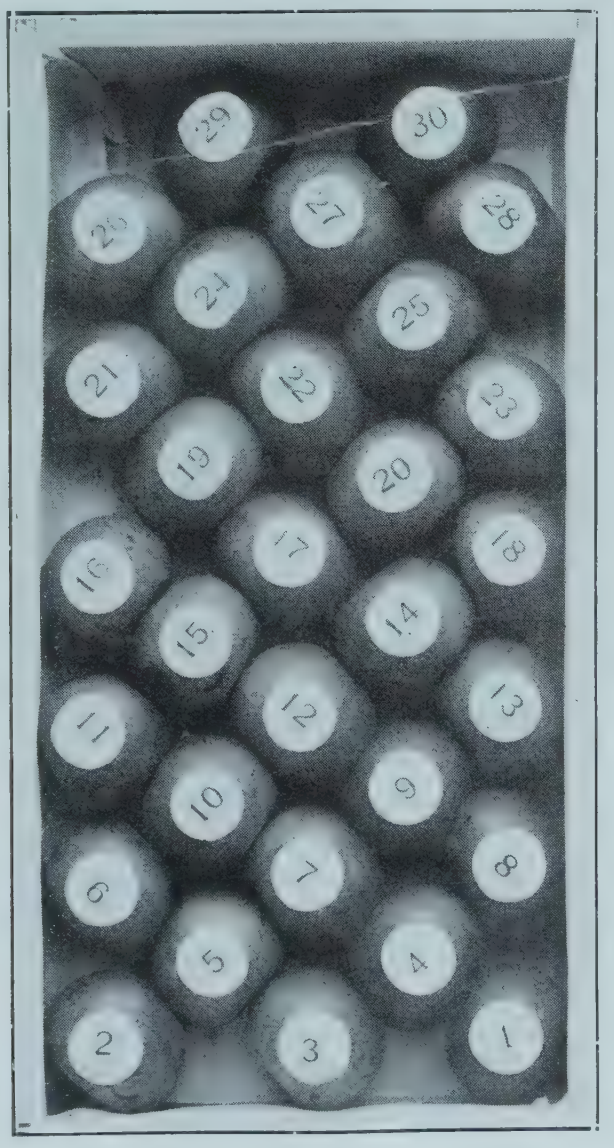


Fig. 7.—2¼-inch. Note that Apples Nos. 1, 2, and 3 are Placed at an Angle with End of Case.

completed layers of 2¼-inch "flat" variety and 2¼ conical variety. It will be noted that all apples are placed at an angle and continued so right through the case, making sure that only the "shoulder" of the apple touches the side of the case, taking care the alignment is maintained throughout the case, and at the same time remembering that each consecutive layer must be placed in the spaces of the previous layers.

Notes for Packers.

A little care and trouble should be taken at the beginning, and speed will come with practice.

Take care not to hump the first apples in each layer against the end of the case.

Packing requires a certain amount of skill. Packers should adapt themselves and remember the various packs.

Particular notice should be taken of the illustrations, noting the placings of the first few apples.

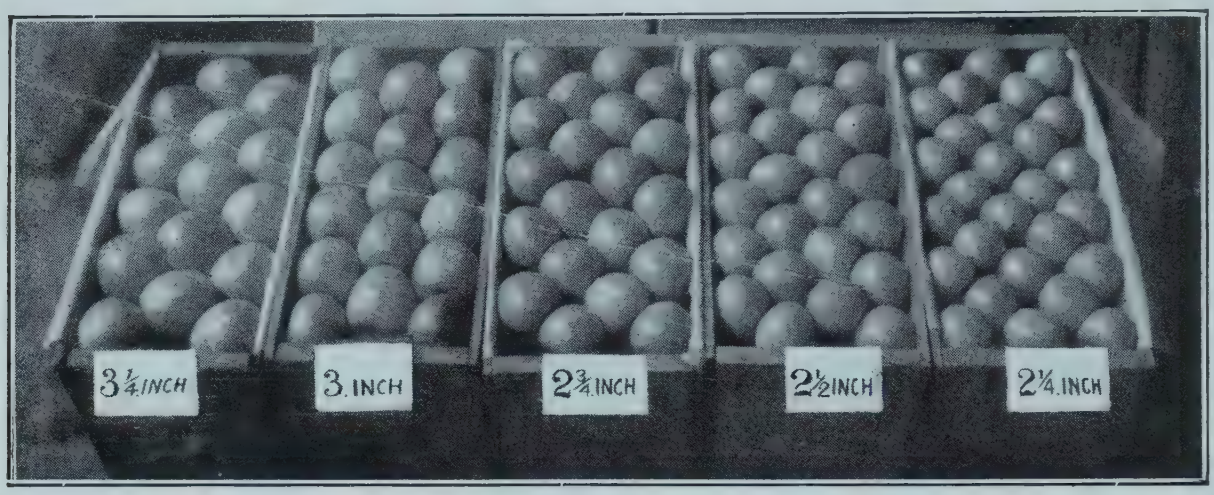


FIG. 8.—THE METHOD OF PACKING CONICAL-SHAPED APPLES. IT WILL BE NOTED THAT THE APPLES IN THE 2½-INCH AND 3-INCH PACKS ARE PLACED FLAT AGAINST THE END, WHILE THE 2¼-INCH, 2¾-INCH, AND 3-INCH ARE PLACED AT AN ANGLE.

Remember the packs illustrated are for use only in the "Tasmanian dump case," inside measurements of same being 18 in. by 14¼ by 8⅔, equalling 2,223 cubic inches.

Packing is repetition of the same motions many hundred times during the day. If, therefore, one unnecessary motion is made with each specimen, it becomes a serious handicap in a day's work.

Remember that the first two apples of 3-inch, 2½-inch, and 2-inch sizes must be packed flat against the end of the case, and the first two apples of the 2¼-inch, 2¾-inch, and 3¼-inch should be packed at an angle. (See illustrations.) Packers will have little difficulty if the illustrations are followed closely.

It is extremely difficult for packers to size and pack at the same time. In the past this was practised in Tasmania largely with a view to economising, but experience has proved that it is not successful. Packers are apt to include larger apples to fill their cases if by chance the second last layer is too low, or smaller apples if the second last layer is too high. This fact has been responsible for disappointment after the

fruit has reached the markets. It is now generally required that fruit must be sized before going to the packers.

METHODS BY WHICH PACKER WILL DETERMINE PACKS TO BE USED.

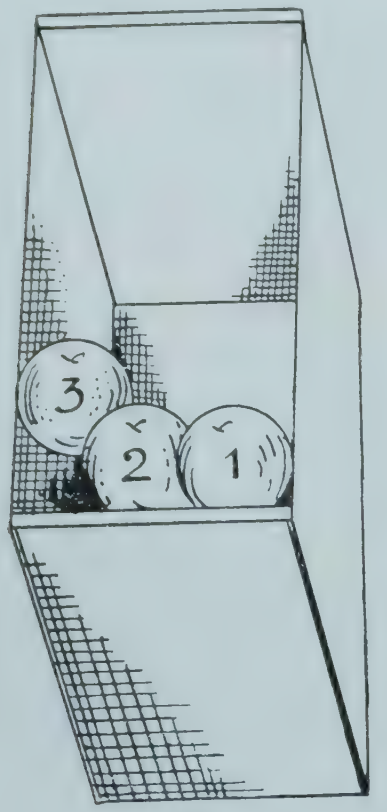


FIG. 9.

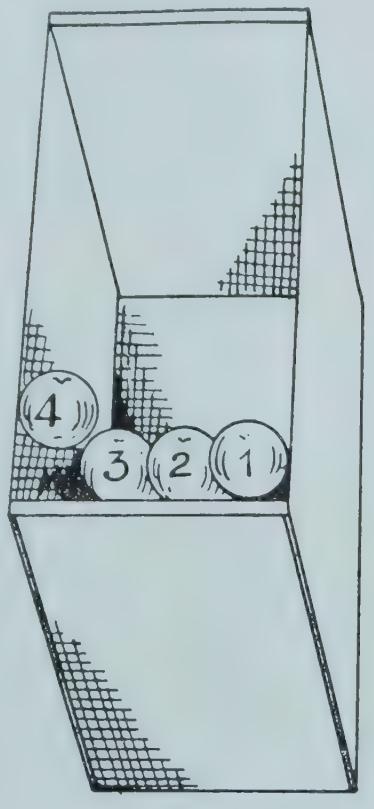


FIG. 10.

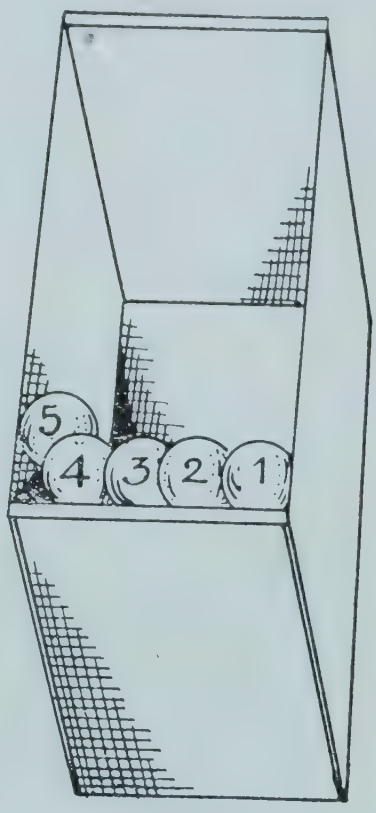


FIG. 11.

FIG. 9.—IF TWO APPLES OF THE SAME SIZE FIT LOOSELY ACROSS THE CASE SIDE BY SIDE, AND THE THIRD WILL NOT GO IN, THE PACK IS 2—1; FIVE LAYERS TO A CASE.

FIG. 10.—IF THREE APPLES OF THE SAME SIZE FIT LOOSELY ACROSS THE CASE SIDE BY SIDE, AND THE FOURTH WILL NOT GO IN, THE PACK IS 2—2; SIX LAYERS TO A CASE.

FIG. 11.—IF FOUR APPLES OF THE SAME SIZE FIT LOOSELY ACROSS THE CASE SIDE BY SIDE, AND THE FIFTH WILL NOT GO IN, THE PACK IS 3—2; SEVEN LAYERS TO A CASE.

Very Fast Packing.

In the past packers have been usually paid by the case for their work; hence it is obvious they wish to pack the greatest number of cases possible each day. Therefore, results are not likely to be satisfactory. Very fast packing is not recommended, for the following reasons:—

(1) Fast packing tends to slum, and wrapping-paper is not placed round the apples properly; therefore its value is much lessened.

(2) In putting the first apples in each layer against the end quickly they bruise. It has been noticed repeatedly during inspection that the apples in the end of the case where the pack starts are bruised, and apples in the other end are quite sound.

Some packers in Tasmania pack between 100 and 150 cases in eight hours, but the writer, after packing in different parts of Australia and New Zealand, has noticed that the best results have been obtained from packers whose capacity is between 50 and 80 cases. The packer who packs 50 to 80 cases in eight hours, and packs them well, is worth more to his or her employer than the packer who packs over the 100 and slums them. Every packer should make a habit of packing each case firmly, but under no circumstances should apples be forced into position. It has been noticed in some sheds that packers, after packing the best part of the case, will spoil the whole case by pressing the last apple into position, often cutting or bruising same on top end of the case, with the result that decay sets in.

PEARS.

Urgent Need for Better Grading and Packing.

In all districts and on every crop about half of the marketing troubles appear to be concerned with the problem of securing a steady and properly prepared output of uniform grade, quality, and appearance. It would not be difficult to obtain such results if all the individual growers in the community produced crops of the same quality and variety, handled them in the same way, and were both competent and willing to grade and pack them correctly. However, such conditions are rarely found. Too often growers ship pears which they acknowledge are not of desirable quality—fruit which they themselves would not eat. If growers of this type can get their poor fruit past the inspector, or conceal it in their carts under fruit of better appearance, they feel they have profited. Unfortunately, this does not end the matter. The wholesaler will have difficulty in disposing of the poor fruit, while the retailer, in turn, probably will lose on it. If it reaches the housewife she will throw it away, and turn to other fruits of better quality, thus decreasing the sale of further consignments. In all these cases the grower eventually loses, directly or indirectly. If the actual loss in money is not deducted from his net returns, he suffers from the injury done his reputation and that of the industry generally. At first thought it would seem reasonable to expect the agents, shippers, or distributors to eliminate such practices, but there is as a rule so much competition among them that they do not accomplish the reforms which individually they know to be desirable. These various weaknesses in the methods now in general use, which are preventing a much-needed improvement in marketing apples and pears, argue for a more efficient system of grading, packing, and inspection of this product.

Picking.

With the pear the proper time for picking may be told best by taking the fruit in the full of the hand and giving it a lateral twist, with the stem taking leverage over the index finger. If fit for picking, the stem will let loose from the fruit spur without breaking. The pear must be picked before ripening, in order to get best quality in flavour and lusciousness. To exactly determine when a variety of pears is ready for harvesting, the grower must judge by the size the fruit has attained and by the ripening of a few premature ones that are always present in a tree. The seed may also be turning at the time. It is recommended to make several pickings, thereby getting a more even size of fruit, resulting in a better average from the orchard. The same careful handling applies to pears as to apples.

Sizing.

Commercially, pears are sized in four different sizes—viz., $2\frac{3}{4}$-inch, $2\frac{1}{2}$-inch, $2\frac{1}{4}$-inch, and 2-inch. In determining the sizes of this fruit it is measured from cheek to cheek, and not from stem to calix. Persons sizing should use rings or wooden gauges cut to the above sizes, remembering that pears going through the 3-inch ring and remaining on the $2\frac{3}{4}$-inch ring are considered to be $2\frac{3}{4}$-inch pears. Pears passing through the $2\frac{3}{4}$-inch ring and remaining on the $2\frac{1}{2}$-inch ring are included with the $2\frac{1}{2}$ size, and those dropping through $2\frac{1}{2}$-inch rings and remaining on the $2\frac{1}{4}$-inch ring are considered as $2\frac{1}{4}$-inch, allowing a quarter of an inch variation, which will meet all requirements.

Packing 2—1 Pack.

Half-cases.—The writer does not recommend the packing of pears in bushel cases, because experience has proved that for shipping and cool storage purposes half-cases and trays have given best results. To pack half-cases it is recommended that the lid part of the case be at the $7\frac{1}{8}$-inch board as shown in Fig. 13.

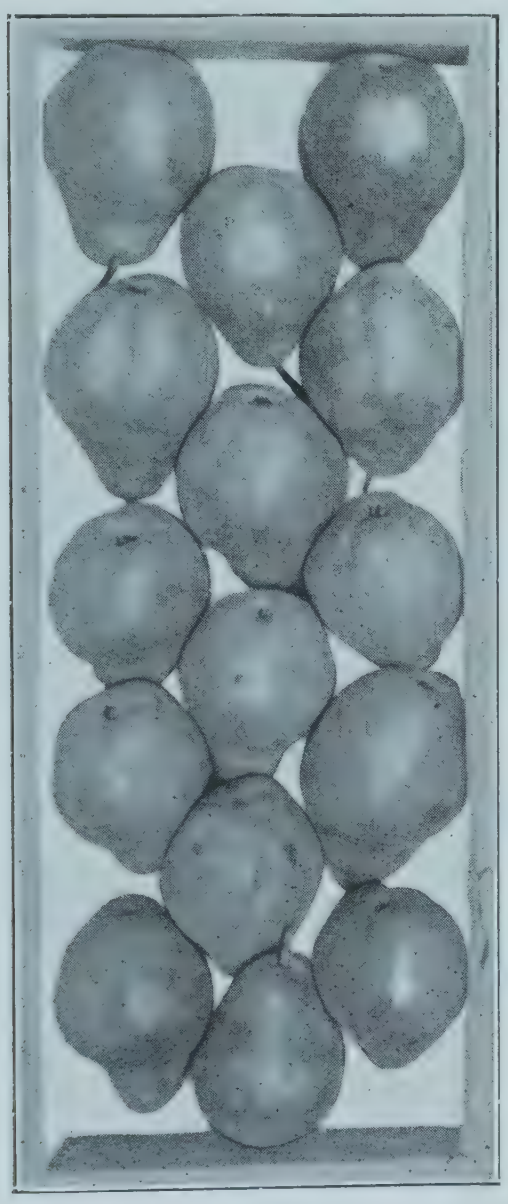


FIG. 12.

FIG. 13.

FIG. 12.—TOP VIEW OF $2\frac{3}{4}$-INCH PEARS.
FIG. 13.—SIDE VIEW OF $2\frac{3}{4}$-INCH PEARS.

Illustration 12 shows the first layer of $2\frac{3}{4}$-inch pears packed in half-cases; illustration 13 shows the side view of the same size. It will be seen that $2\frac{3}{4}$-inch pears pack 2—1 four layers to the half-case. Note that each successive layer is placed immediately in the spaces made by the layer below, and the pears finishing the layers are reversed. Illustration 14 shows first layer of $2\frac{1}{2}$-inch pears. Illustration 15 shows side view of the same size. It will be noted that $2\frac{1}{2}$-inch pears also pack 2—1, four layers to the half-case. The reason of this is, being $2\frac{1}{2}$-inch, the pears pack closer together, decreasing the space between each specimen.

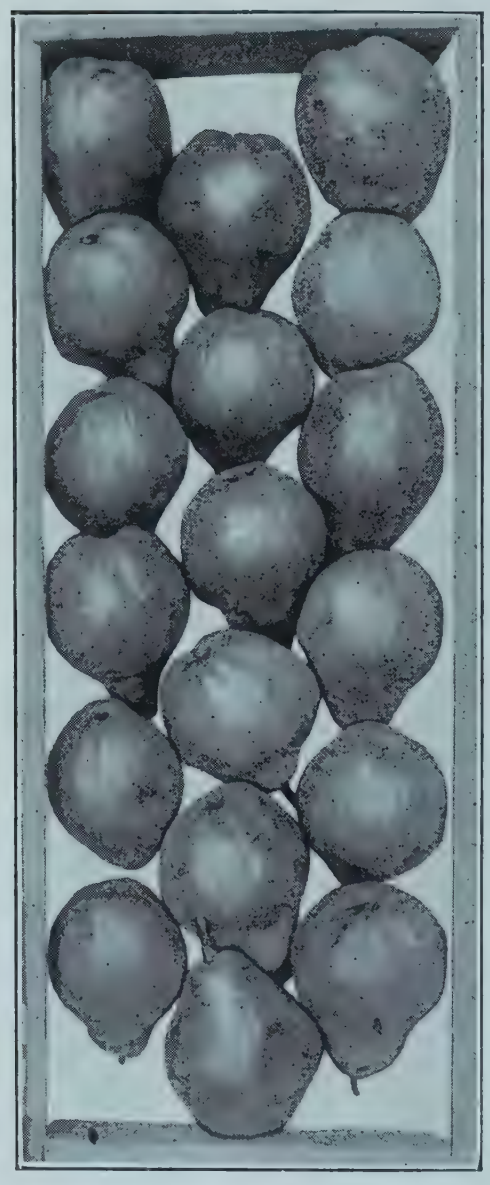


FIG. 14.

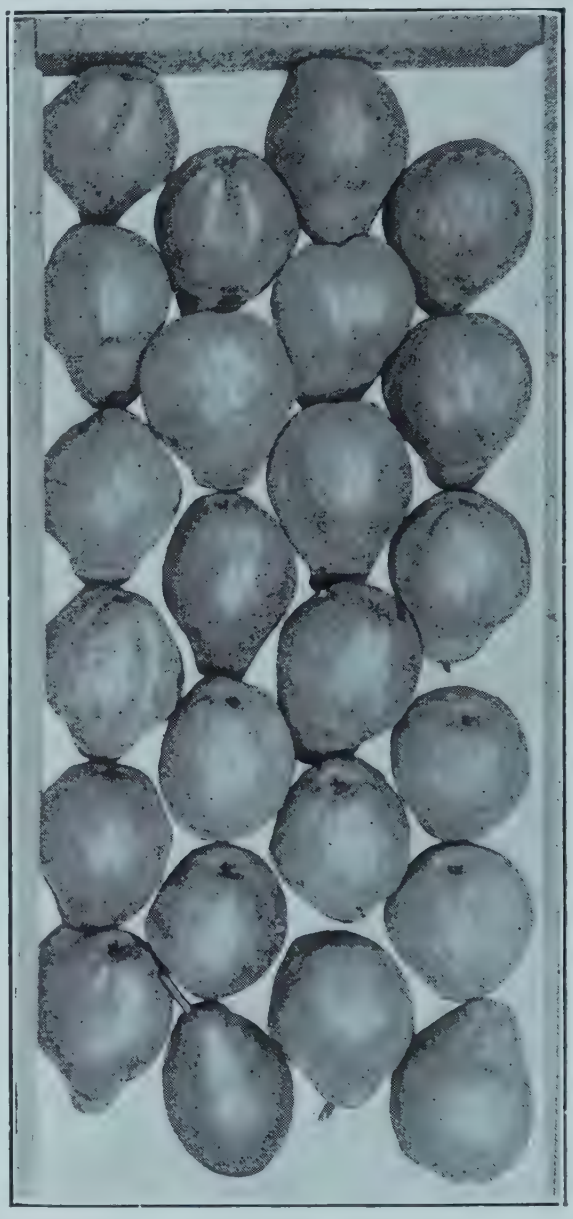


FIG. 15.

FIG. 14.—TOP VIEW OF $2\frac{1}{2}$-INCH PEARS.

FIG. 15.—SIDE VIEW OF $2\frac{1}{2}$-INCH PEARS.

2—2 Pack. Half-case Packing.

Half-cases.—The 2—2 pack is used for 2¼-inch and 2-inch pears. Illustrations 16 and 17 show the first layer and side view, respectively. It will be noted that five layers fill the half-case; always remembering to reverse the last two pears in each layer. The reversing is essential to produce a firm pack.

Fig. 16.

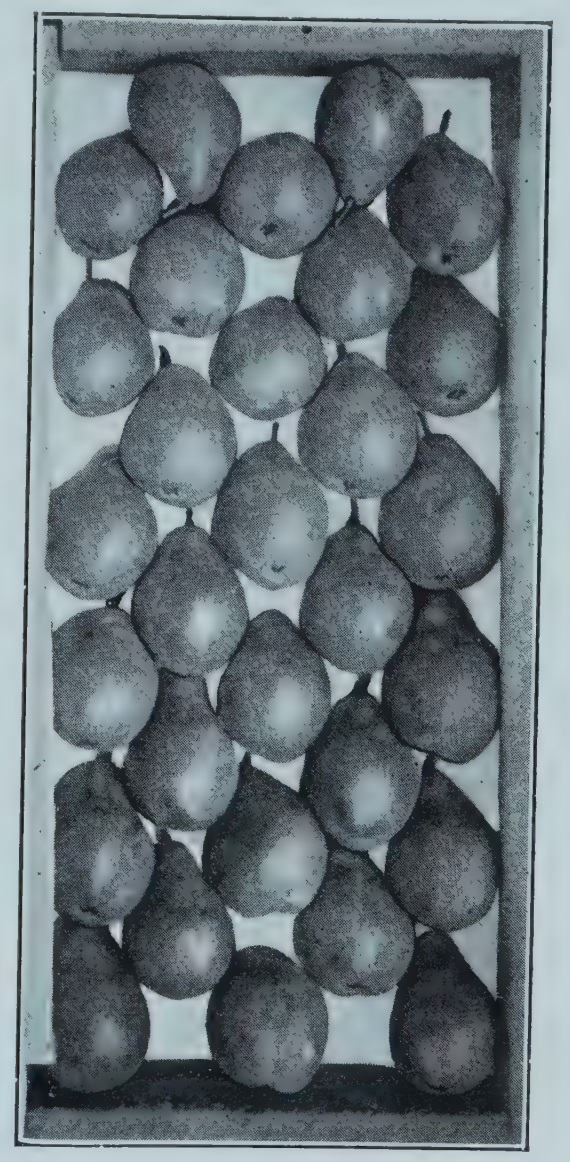


Fig. 17.

Fig. 16.—Top View of 2¼-inch Pears.
Fig. 17.—Side View of 2¼-inch Pears.

Packers will have considerable difficulty in packing 2¼-inch pears if the opening of the half-case is the same as the bushel. But make your half-cases as shown in Fig. 16, follow the instructions, and little difficulty will be experienced. Again reverse the last two pears in each layer. Take care not to break the stem end, and eliminate stemless specimens, especially for cool storage and distant markets. Size pears before commencing to pack, and do not roll the fruit about on the packing table, but pack from case to case.

Trays.

It has been found that for export to overseas markets the tray is preferable as a package for pears. There are several reasons for this—(1) The fruit carries better, (2) it facilitates packing, (3) shows fruit to better advantage, (4) eliminates much bruising at the stem end. This part of the pear ripens first and requires very careful handling.

FIG. 18.—SHOWING 2¾-INCH, 2½-INCH, 2¼-INCH PEARS PACKED IN TRAYS. AS THERE IS ONLY ONE LAYER, THE ILLUSTRATION IS SELF-EXPLANATORY.

PEACHES.

The greatly increased production of peaches, with the resulting keener competition on the markets, makes it more necessary than ever that every commercial grower of this product should produce fruit of fine quality, eliminate undesirable varieties, pick carefully, size and pack correctly, to enable the fruit to carry to the markets in the best possible condition. As in the case of all soft fruits, peaches must be handled rapidly and very carefully throughout harvesting, sizing, and packing operations.

FIG 19.—SIDE AND TOP VIEW OF WELL-PACKED CASE OF 2¾-INCH PEACHES.

Picking.

The time for picking the peach depends largely upon the distance of the markets. Local markets will allow the peach to ripen further than when it is intended to be shipped in closed vans and in transit a number of days. Peaches are often allowed to ripen and colour too much before being picked, resulting in early decay and excessive over-ripeness. However, the peach should have attained full size and started slightly to colour at the time of picking. When picking peaches extreme care should be taken to handle the fruits without squeezing or unnecessary pressure. With a side twist of the hand remove the peaches from the branches without injuring the flesh. The fruit should not be dropped into picking baskets, but each specimen should be laid gently and quickly in the bag or basket, great care being taken when emptying the contents of bag or basket into the orchard box.

Sizing.

When sizing peaches do not empty the fruit on to a packing table or bench, but instead size direct from the orchard box into shipping cases. The packer can then pack direct from case to case, eliminating rolling

Fig. 20.

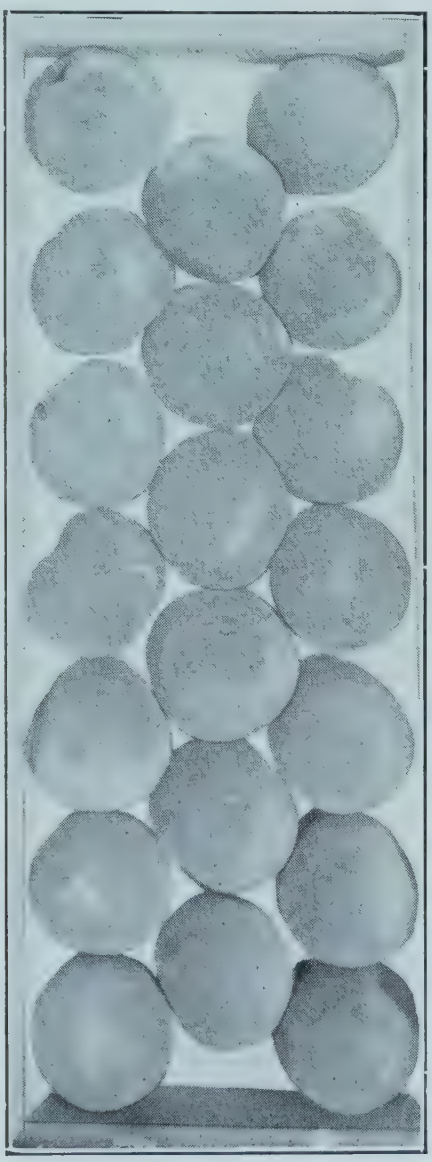


Fig. 21.

Fig. 20.—Side View of 2¾-inch Peaches.
Fig. 21.—Top View of 2¾-inch Peaches.

of the fruit about on the benches and searching for the various sizes. If the peach is sized into $2\frac{3}{4}$-inch, $2\frac{1}{2}$-inch, $2\frac{1}{4}$-inch, and 2-inch sizes they will meet all requirements.

FIG. 22.

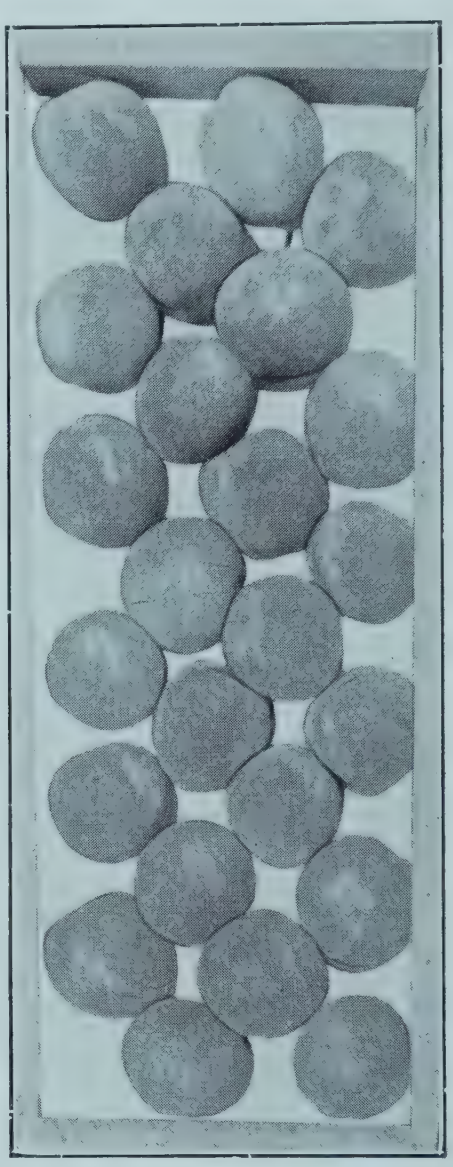


FIG. 23.

FIG. 22.—SIDE VIEW OF $2\frac{1}{2}$-INCH PEACHES.

FIG. 23.—TOP VIEW OF $2\frac{1}{2}$-INCH PEACHES.

Packing.

Retailers and shopkeepers desire that the projecting portion of the peach—that is, the part which ripens and colours first, should not be bruised. If peaches are displayed in shop windows with this part disfigured they look unsightly and decay early and are a loss to the retailer, which is indirectly a loss to the grower. Therefore, it is necessary to preserve this part of the peach by packing in such a way that it does not come in contact with the sides of the case. Illustration 19 shows part of peach touching the side of the case. The stem end is considered

to be the hardest part of the peach, and illustration Fig. 19 shows this part of the fruit packed towards the side. The great essential, however, for successful packing is correct sizing.

Illustration 20 shows top view of $2\frac{3}{4}$-inch peaches.
Illustration 22 shows top view of $2\frac{1}{2}$-inch peaches.
Illustration 25 shows top view of $2\frac{1}{4}$-inch peaches.
Illustration 21 shows side view of $2\frac{3}{4}$-inch peaches.
Illustration 23 shows side view of $2\frac{1}{2}$-inch peaches.
Illustration 24 shows side view of $2\frac{1}{4}$-inch peaches.

Take particular care to pack each successive layer in the spaces of the former layer.

FIG. 24.

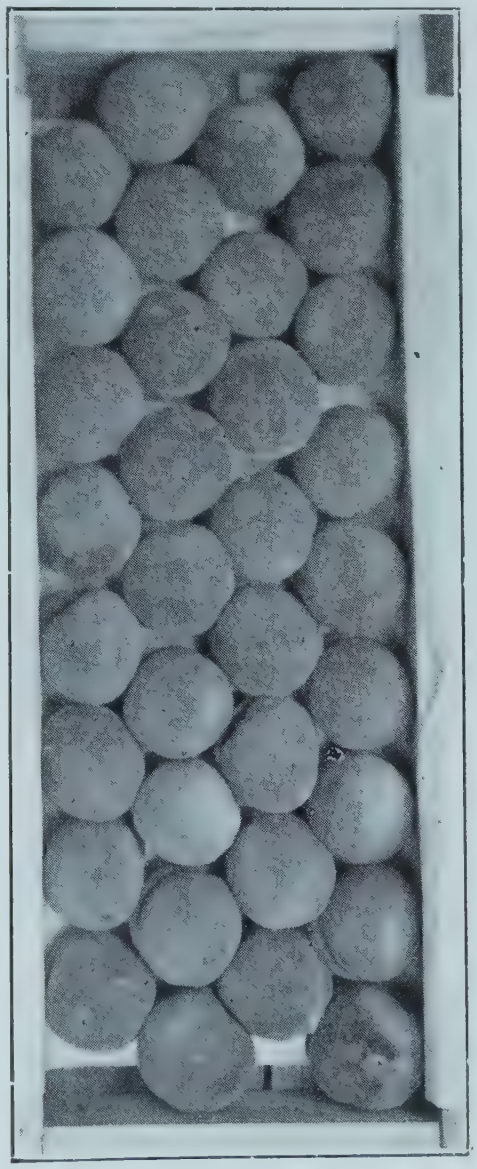


FIG. 25.

FIG. 24.—SIDE VIEW OF $2\frac{1}{4}$-INCH PEACHES

FIG. 25.—TOP VIEW OF $2\frac{1}{4}$-INCH PEACHES.

TOMATOES.

Much can be said in favour of sizing and packing tomatoes, especially when they are required for shipping to local or distant markets. It is of great importance that the tomatoes in each case be of uniform size, for large and small tomatoes packed together constitute an undesirable package. It not only makes a very poor appearance on the markets, but is disliked by retail buyers because of the fact that the tomatoes contained therein cannot all be sold at the one price. Restaurants, hotels, railway dining-cars, and similar institutions require tomatoes of even size, as the *trade demands* make it desirable for them to serve every customer with equal portions. The tomato-grower who wishes to establish a reputation for himself should size and pack carefully.

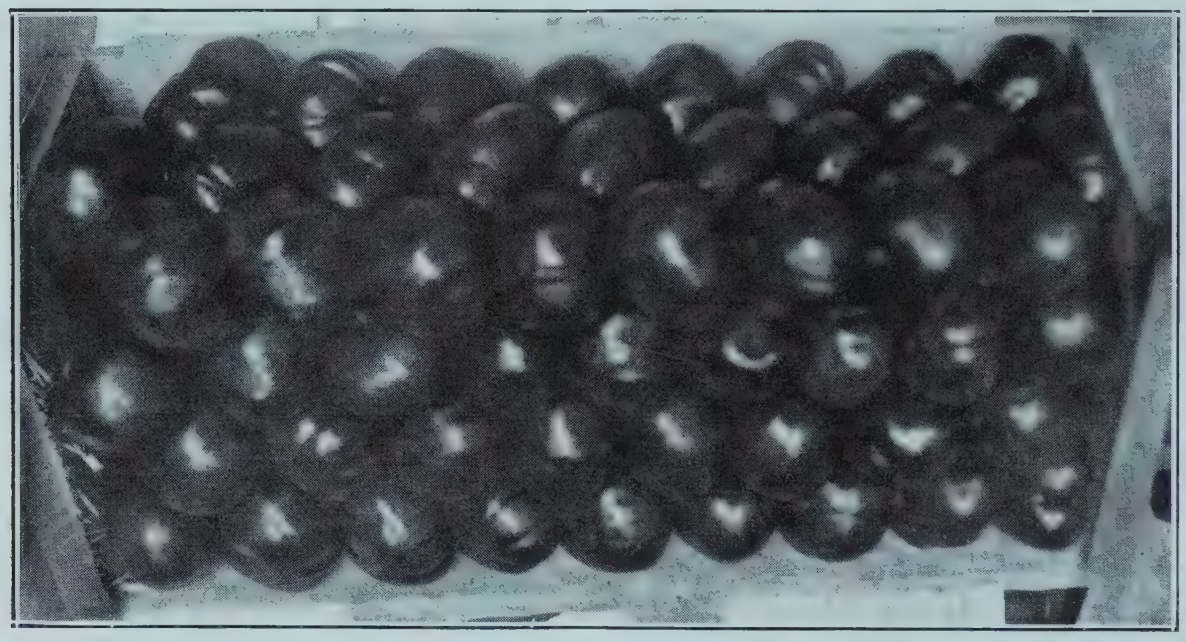


FIG. 26.—SHOWING SIDE AND TOP VIEW OF WELL-PACKED CASE OF $2\frac{3}{4}$-INCH TOMATOES.

Picking.

When tomatoes are to be forwarded to the markets by rail or steamer they should be picked when they show a yellowish colour; for immediate sale they should be fairly ripe. Careful handling of this product is essential. Each vine should receive equal attention in order to prevent some of the fruit becoming over-ripe. Tomatoes should be marketed as soon as possible after picking.

Sizing.

This operation is carried out on the same lines as for peaches and apples, with the same variation of a quarter of an inch. Tomatoes over the size of 2-inch diameter should be sent to the cannery or factory. Sized to $2\frac{3}{4}$-inch, $2\frac{1}{2}$-inch, and $2\frac{1}{4}$-inch, they will suit the trade admirably.

Do not empty or roll tomatoes about on the benches. It is much quicker and gentler to size direct from the orchard box or basket into the marketing cases.

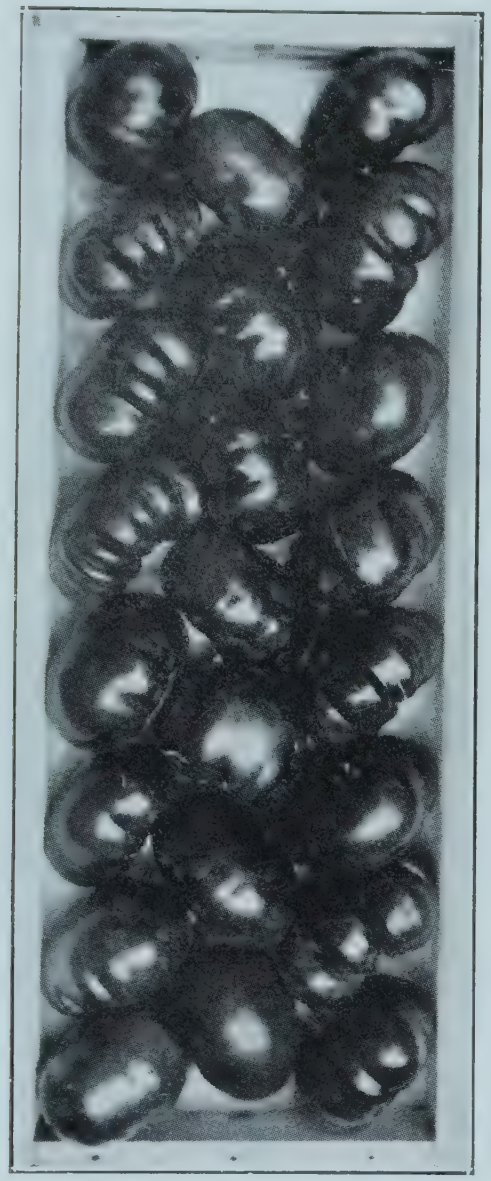


Fig. 27.

Fig. 28.

Fig. 27.—Side View of $2\frac{3}{4}$-inch Tomatoes.

Fig. 28.—Top View of $2\frac{3}{4}$-inch Tomatoes.

Packing.

Tomatoes are packed similarly to apples—that is, as far as the placing of the fruit is concerned. Fig. 27 shows first layer of $2\frac{3}{4}$-inch with tomatoes packed 2—1, four layers to the half-case. Fig. 28 shows $2\frac{1}{2}$-inch tomatoes packed 2—2, four layers to the half-case; $2\frac{1}{4}$-inch tomatoes pack 2—2, five layers to the half-case; the placing of this size is more on the angle.

PLUMS.

The illustration Fig. 28 shows plums packed in trays and half-cases. The trays are found to be the most suitable for the carriage of this fruit, half-cases being too bulky. The inside measurements of the trays are 18 by $2\frac{7}{8}$ by $14\frac{1}{4}$. (This size tray is also used for pears.) Large plums, such as Grand Duke, Presidents, &c., packed on their ends make a fine display, one layer to each tray; while smaller plums (Greengages, &c.) pack two layers to the tray. The illustrations are self-explanatory. It is not recommended to wrap plums for nearby markets, but for cool store and distant markets we have found it advisable to wrap.

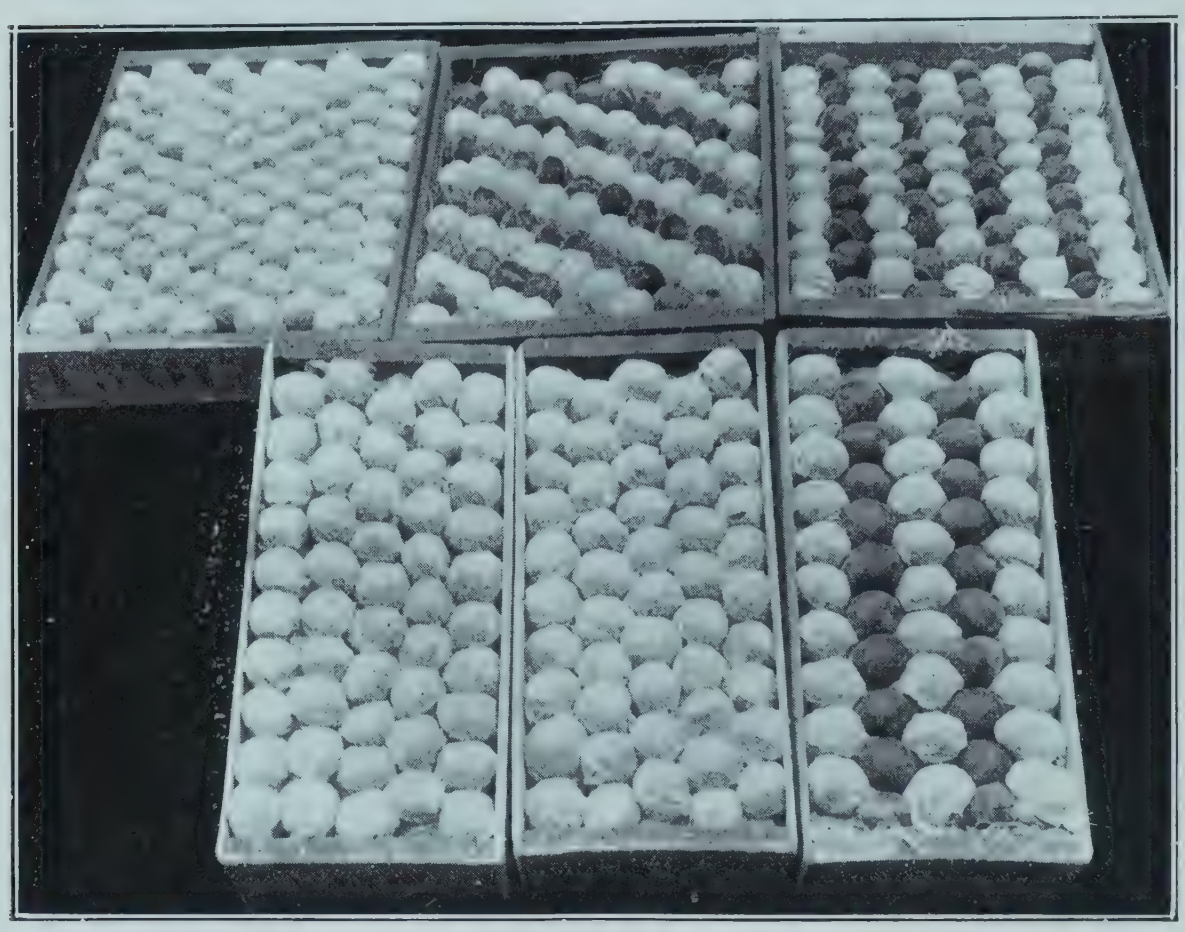


FIG. 29.—PLUMS PACKED IN SINGLE-LAYER TRAYS AND IN HALF-BUSHEL CASES—SOME WRAPPED, OTHERS UNWRAPPED—AS SHIPPED FROM TASMANIA TO ENGLAND, MARCH, 1922.

COTTON PESTS IN NORTH QUEENSLAND.

Mr. B. L. Jardine, Somerset Copra Plantation, North Queensland, writes:—In respect to the recent report made available by the Minister for Agriculture (Hon. W. N. Gillies) under the heading "Cotton Pests Occurring on the Darling Downs" ("Q.A.J.," December, 1922), I beg to report the following:—In this locality the same trouble was experienced a short while back, and for a time the position was very grave, as complete destruction of the crop was threatened. Immediate investigations, with the object of minimising further destruction, were made and, notwithstanding the early discovery and quick arrest of the trouble, considerable damage was done to the rest of the young plants, the nature of which resembled that described in the notes referred to.

Soon after the planting of the seed, between the third and fourth day, the first evidence of some nocturnal incursion was noted. At this period the young plants were commencing to show through the earth and many were found to have been severed below the bursting seed cells and leaves, with no further disfigurement to the dismembered parts. Day after day the trouble continued with increasing intensity until the surviving plants had attained the height of 5 or 6 in. Then the trouble vanished as abruptly as it came. The gaps in the rows were replanted, only to meet with a heavier percentage of loss. An examination made of the planted areas in the early hours of the morning revealed the cause of the destruction. A large reddish black ant $\frac{5}{8}$ in. long, armed with powerful saw-like mandibles, its forepart not unlike the stag beetle, was attacking both seeds and young shoots with great avidity. It was also noticed that rodents had developed a keen taste for the seed and proved a nuisance equally as great.

Habits.—The ant is nocturnal in habit and lives in sub-surface communities in cavities connected with the open by a passage or tunnel. By day its movements are sluggish and are confined to the vicinity of its colony; but at night it becomes very active, and, like most insects of its class, has no particular preference to any one fodder plant, and is therefore a ready victim to poison.

Remedies.—Soon after the land has been cultivated a search for their colonies should be made. These may be located easily by the newly powdered earth thrown up. (1) Insert caustic soda in tunnels, then add water; (2) poison-arsenic, soda, and syrup; (3) medicate seed before planting with ten drops of lysol or phenyle to pint of water; allow the seed to stand in the solution for an hour or so before planting. This will be found very effective. (4) No. 3 in addition to poisoning as an effective precaution against rats.

QUEENSLAND TREES.

By C. T. WHITE, F.L.S., Government Botanist, and W. D. FRANCIS, Assistant Botanist.

No 20.

The Rose-leaf or Pink Marara, *Ackama paniculata,* is a very common tree on Roberts's Plateau and on the Eungella Range, further north. Our pictures show typical specimens of the species. The barrel is very often flanged at the base. The bark is light or yellowish grey in colour and often wrinkled with warts disposed in rows or in the wrinkles; when cut it is pale brown or pinkish, becoming paler inwards. The surface of the sapwood is white when the bark is peeled off. The generic name Ackama originated from the Maori name "Makamaka" for a closely allied tree, *Ackama rosæfolia,* growing in the North Island of New Zealand. Our species is confined to Australia and is found in rain forests as far south as the Hawkesbury River in New South Wales (C. Moore), and as far north as the Eungella Range, westward of Mackay in Queensland. The Northern Rose-leaf Marara, *Ackama quadrivalvis,* which is found at Atherton and Rockingham Bay, resembles the southern species in many ways. Its chief difference is in the possession of 4 (rarely 3 or 5) cells in the capsules instead of the 2 cells of the more southern species.

Photo. by the Authors.

PLATE 93.—THE ROSE-LEAF MARARA (*Ackama paniculata*).
A tree on Roberts Plateau, National Park.

Photo : Dept. Agriculture and Stock.]

PLATE 94.—THE ROSE-LEAF MARARA.

A.—Flowering twig. B.—Twig bearing capsules.

THE WORLD'S PRODUCTION OF TEXTILE CROPS.

The International Institute of Agriculture at Rome has published an interesting report on the world production of textile crops in 1922, as compared with pre-war production. In summarising its findings, it places the aggregate cotton production of a group of countries responsible for about 85 per cent. of the world's total production at 73,000,000 centals, or a decrease for 1922 of approximately 16 per cent., as compared with the corresponding pre-war average of 87,000,000 centals, although showing an increase over the production of 1921-22, which was 59,000,000 centals. The production for 1921-22 was, however, exceptionally poor, due in a great part to the deficient yield of the United States, which was the lowest recorded for twenty-five years. The cultivated area under cotton in 1922-23 (56,000,000 acres) exceeded that cultivated the previous season by about 12 per cent., and was only 4 per cent. below the pre-war average cultivation. The yields per acre in 1922-23 even cannot be looked upon as favourable, a yield of only 1.3 centals per acre being obtained, as compared with an average of 1.5 centals for the five years' period, 1909 to 1913.

STUD STOCK STUDIES.

Best Breeds of Pigs for Queensland Conditions.*

Tamworths.

Authorities claim this breed is directly descended from the wild pigs of Europe, and that it has been domesticated in the Midland Counties of England for centuries, and the manner in which it gathered its food there, no doubt, has had a good deal to do with perpetuating the long, straight snout and razor-back appearance characteristic of the breed. Latterly, a limited improvement has been effected in the body conformation of the best specimens of Tamworths, but careful selection is necessary to maintain type.

The chief characteristics associated with the improved Tamworth are:—

A distinctive whole-red coating of hair; a long narrow head and straight snout; fine, rigid ears with a forward inclination; rather fine, lengthy neck; fine shoulders; long, narrow, slightly arched back, with strong loin; lengthy, meaty hindquarters which, with a well set-on tail, finishes off a body which must have good depth, and be supported by strong, straight, evenly placed long legs, with flat bone.

The Tamworth is recognised as a gross feeder; it possesses a good constitution, and is prolific, the sows being good mothers and free sucklers.

Farmers with an eye for the neat, symmetrical outline of the Berkshire and Mid. Yorkshire, are not attracted by the lengthy snout, narrow head and body, and the lean-looking appearance of the Tamworth. These characteristics will naturally keep the latter, as a distinctive breed, from gaining universal favour.

Poland-China.

This breed is a composite one, evolved in the hog-raising States of U.S.A. The chief characteristics of the breed are as follows:—

Colour, black, with white markings on face and legs; of medium size; short and compact; thickly fleshed; deep bodied, and set on short, evenly placed legs. The head is short and broad; short face with a distinct taper from eyes to point of nose; ears slightly drooping; full jowl; neck, full and short; shoulders, full and rounded on top; ribs, well sprung and deep; body, even and deep, with good underline, showing full, thick flanks; full, deep, fleshy hams.

Authorities agree as to the docility of this breed of pig and its ability to rapidly lay on a wealth of flesh and fat; the tendency, however, is for the animals to become too fat, which has earned for them the designation of "lard" hogs.

It is not considered that the Poland-China enjoys any advantages over the Berkshire for use in this State, but rather that it is inferior to the former in size, length of body, and prolificness.

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*From "Pig Raising in Queensland" (E. Graham and H. C. Quodling), Department of Agriculture and Stock, Queensland, October, 1922.

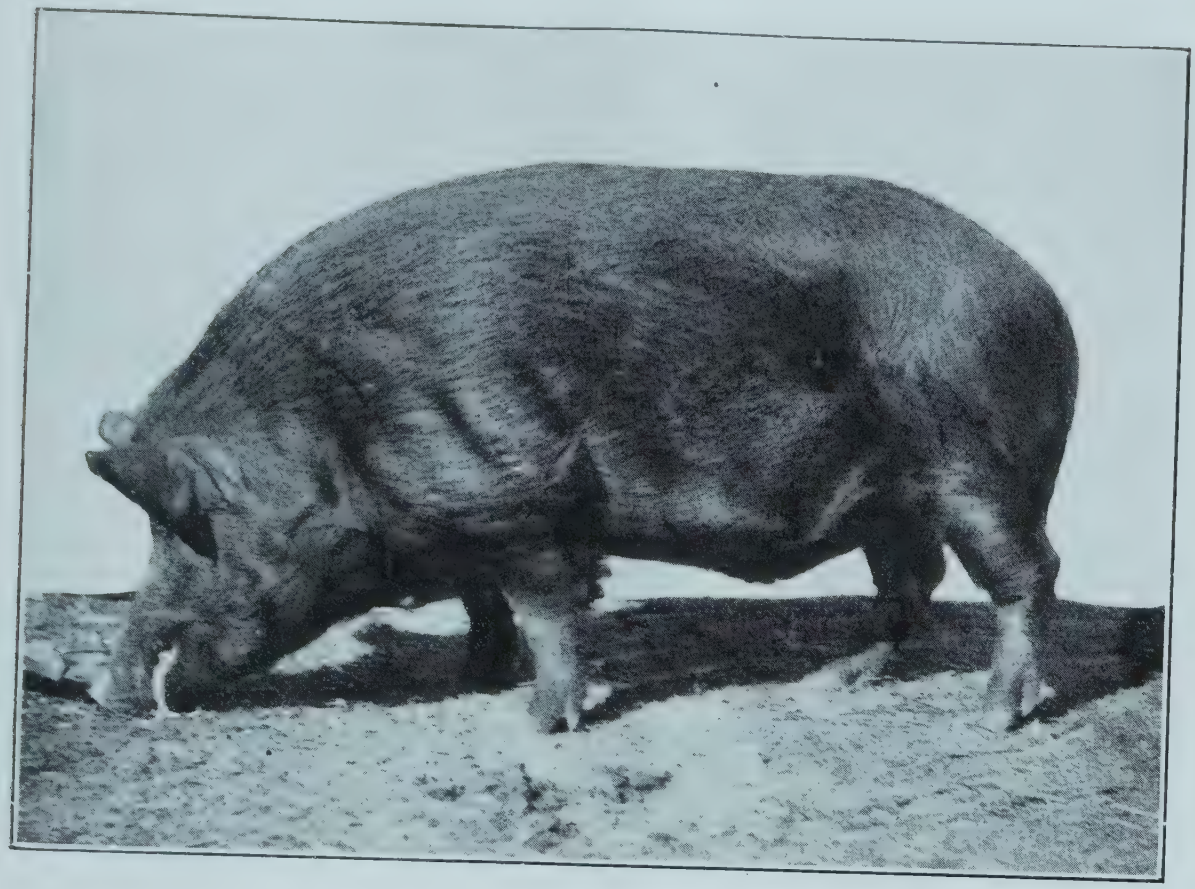

PLATE 95.—TAMWORTH BOAR.

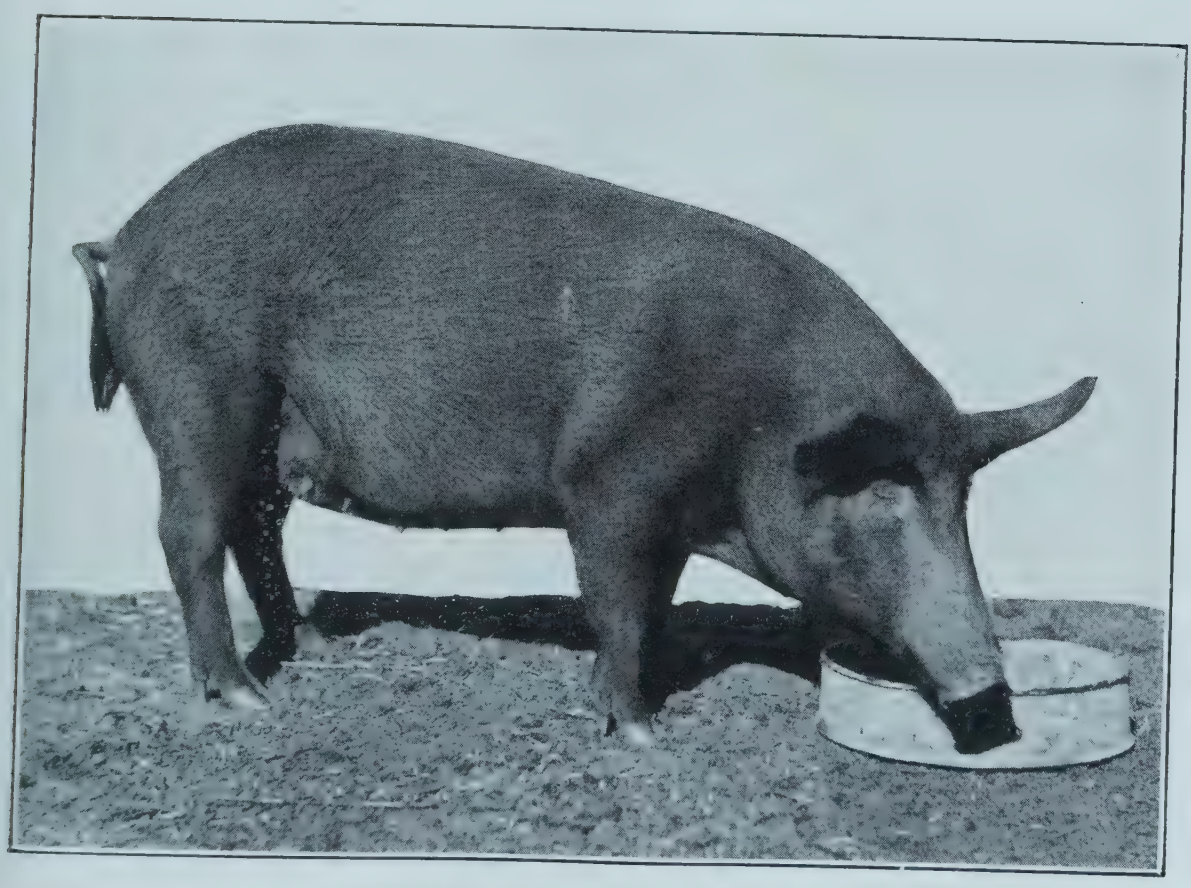

PLATE 96.—A YOUNG TAMWORTH SOW.

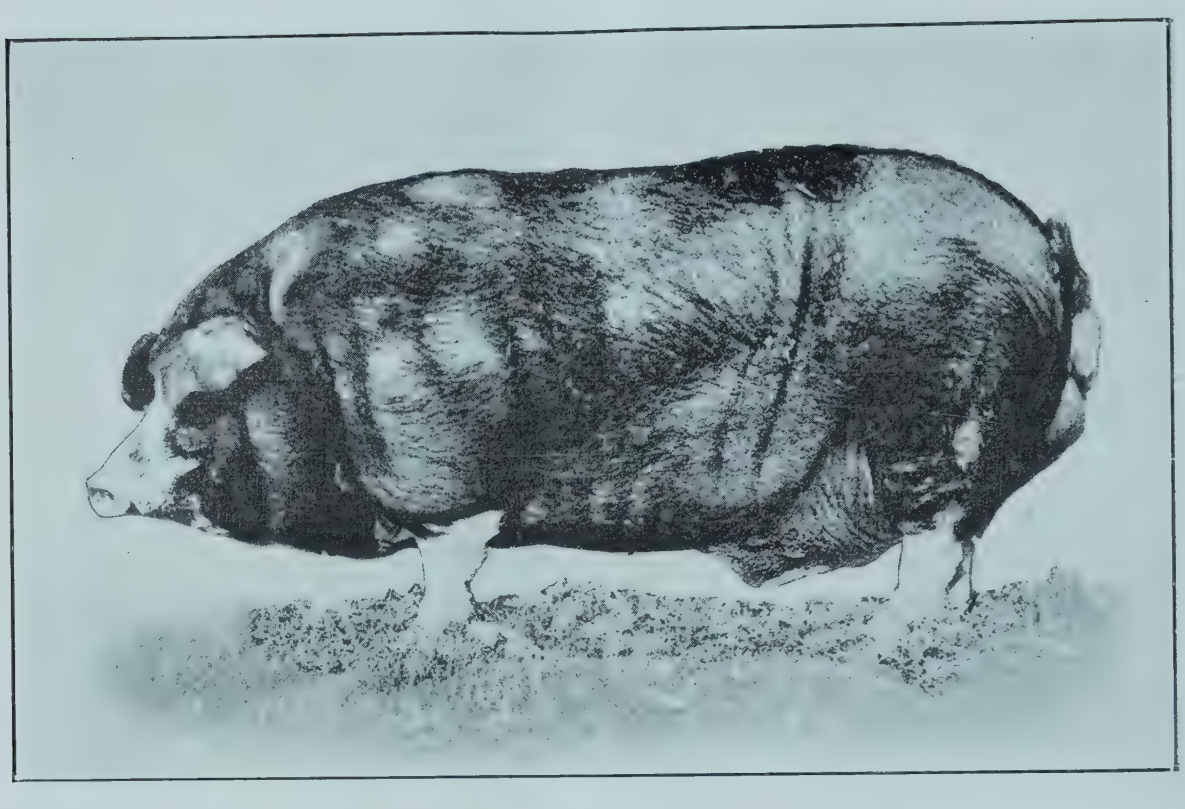

PLATE 97.—POLAND-CHINA BOAR.

PLATE 98.—POLAND-CHINA SOW

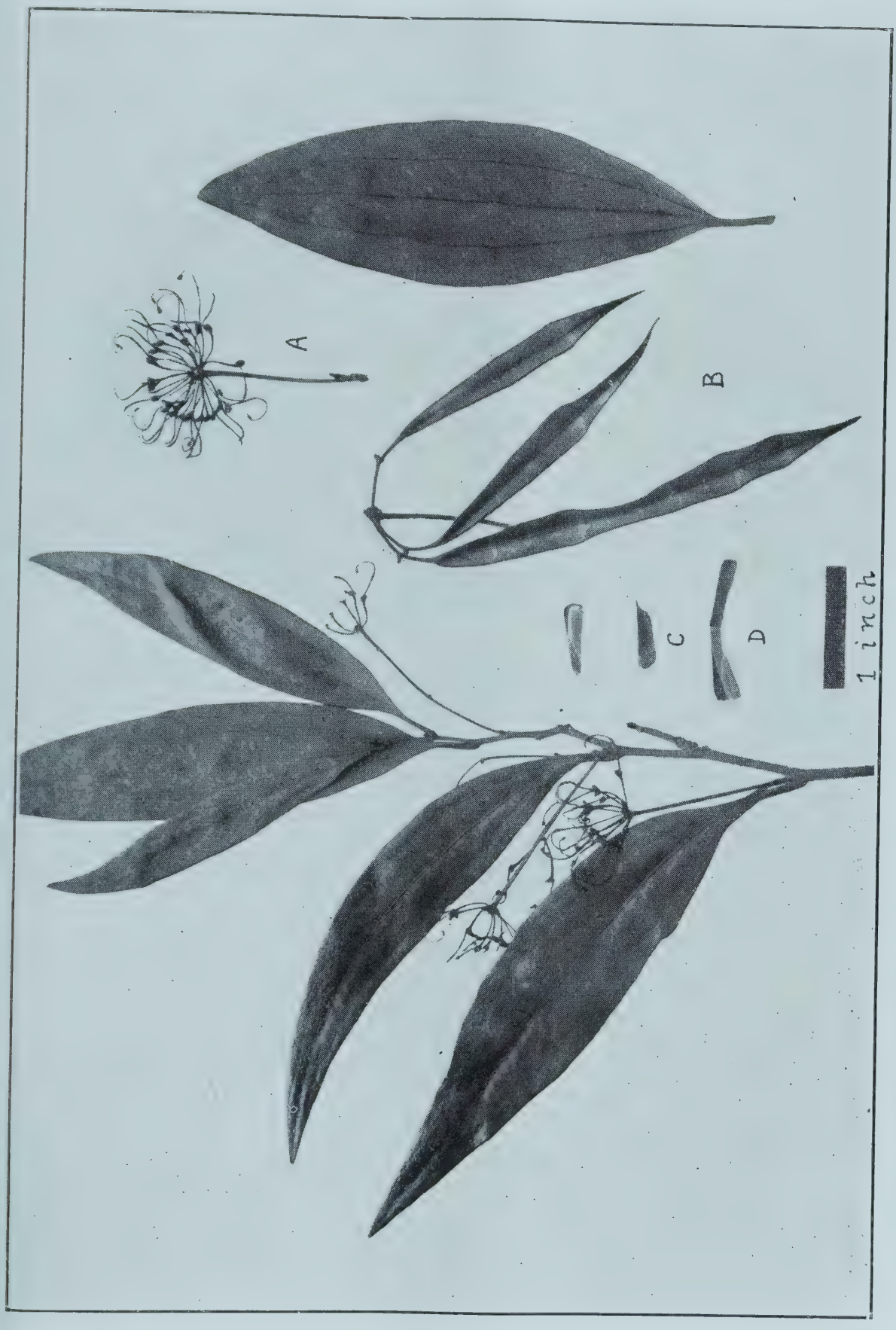

Photo: Dept. Agriculture and Stock.]

PLATE 99.—THE SCRUB BEEFWOOD. (Omitted from April Journal.)

A.—Inflorescence. B.—Seed Vessels. C.—Seeds. D.—Showing a seed inserted between two lamellae.

IMPROVING THE QUALITY AND PRODUCTIVENESS OF FRUIT AND FRUIT TREES.

By ALBERT H. BENSON, M.R.A.C., Director of Fruit Culture.

In the February number of the "Queensland Agricultural Journal" for 1898 an article dealing with the "Propagation of Fruit Trees," and contributed by the writer, was published. The article in question was a reproduction of a paper read at the meeting of the Australasian Association for the Advancement of Science, held in Sydney in January, 1898. After twenty-five years I see no reason to alter my opinions, but am again submitting the advice I then gave. I have no hesitation in saying that had this advice been acted upon the fruitgrowing industry of Australia would be on a more satisfactory basis than it is to-day, and the many diseased, useless, inferior, and unprofitable trees now cumbering the orchards in every State of the Commonwealth would not have been propagated, let alone planted. Unfortunately, the propagation of inferior varieties still continues, and the paramount importance of bud and stock selection is not realised; buds or grafts being frequently procured from the most accessible source irrespective of the vigour, health, and productiveness of the tree from which the scions are obtained or the vigour of the stock upon which the scions are worked. To-day there are many thousands of apple, citrus, and other fruits growing on the wrong stocks; that are lacking in vigour and that will never make a satisfactory or profitable tree capable of producing regular crops of the best quality. This is a very serious matter, for, on account of the enormous increase in the production of fruit, not only in Australia but elsewhere, there is a constantly increasing difficulty in obtaining profitable markets and there is practically no market for inferior lines.

The planting of inferior and non-productive varieties of fruit is inimical to the industry, and unless it is stopped will lead eventually to serious loss. American authorities recognise this, and for some years have been carrying out exhaustive tests to prove the value of bud selection, with the result that the trees produced by such selection are regular bearers of the highest quality fruit, thus confirming my original contention in every respect.

American nurserymen recognise the importance of bud selection and many are only using the wood taken from trees having a record for quality and quantity productiveness; in brief, from proved "stud" trees, so that purchasers of the trees worked therefrom are practically certain of having an orchard in which the trees can be depended upon to yield a satisfactory return of high quality fruit, instead of one containing a number of trees bearing fruit of very variable quality and very uncertain in the matter of production; in fact, an orchard such as is altogether too common in Queensland. It is fully time that our nurserymen made a serious attempt to improve the stamina and quality of the trees they propagate, so that when planted out permanently they are able to grow into vigorous trees possessing a good root system and capable of yielding a maximum crop of the highest quality fruit. This can only be brought about by the exercise of the greatest care in the selection of the stocks and scions—in brief, by systematic propogation, or, to use a stockman's term, "stud breeding."

Fruitgrowers have the remedy in their own hands, as once they let nurserymen know that they will only purchase trees of guaranteed quality worked from trees of proved excellence, they will get what they ask for, but as long as they accept anything offered to them by nurserymen they cannot expect much improvement.

Following is an extract from the article referred to ("Propagation of Fruit Trees," "Q.A.J.," February, 1898) and which holds as good to-day as when first written:—

The Selection of the Stock.

This is a matter of vital importance, and one that seldom receives the careful consideration it should, as not only should the stock be chosen that assimilates most readily with the scion, and thus forms a complete and perfect union with it, but it should also be the one that is best adapted to the soil in which the tree is to be permanently planted; and in addition to these qualifications, there is one other of even greater importance, and that is the constitutional vigour of the stock itself.

I am strongly in favour of exercising the greatest possible care in the selection of stocks possessing strong constitutions, as it is on the constitution of the stock that the future vigour, freedom from disease, and length of life of the tree largely depends. Seedlings make the best of all stocks—not seedlings raised indiscriminately, but seedlings that are grown from carefully selected seeds that have been obtained from vigorous healthy trees that are known to be constitutionally robust, as the

seedlings produced from such seeds are more likely to produce healthy vigorous stocks than those grown from seeds that have been taken indiscriminately from any fruits that are available. Stocks are often raised from cuttings or by means of root-grafting, but such never possess as good a root-system as the seedling, nor have they the same vitality or inherent vigour. But when it is desirable to produce stocks by these means, every care should be taken to obtain the cuttings from strong-growing, healthy, vigorous trees. Be particularly careful to obtain both seeds and cuttings from healthy trees, as many of the most troublesome diseases of fruit trees are transmitted from parent to offspring, especially in the case of citrus and stone fruits. These remarks do not refer to any particular variety of fruit, but to all fruits, as, no matter what kind of fruit you are propagating, if you wish to maintain a high standard of excellence, you must use selected stocks, and these stocks must be selected in the manner I have just described.

Selection of Scion.

In order to produce the best fruit (and by the best fruit I mean that which is of most value commercially, and which pays the grower best), it is absolutely necessary that the same care shall be exercised in the propagation of the tree as the successful breeder of stock takes for the raising of horses, cattle, sheep, or other live stock; and just as the successful breeding of stock depends on the careful selection of the sire and dam, so the successful propagation of the best fruit depends on the careful selection of the stock and scion.

One of the best known laws of Nature, both as regards the propagation of animals or plants, is that like produces like, and that by a careful selection of and propagating only from the best that both animals and plants become improved. This being so, it therefore stands to reason that the greater the care that is taken in the selection of the scion, be it bud, graft, or cutting, the greater the chance that the tree produced from such scion will produce fruit of equal quality to the parent tree from which the scion was obtained, and, if the stock has been selected as well, then that the tree resulting from the union of such stock and scion may be superior to the parent tree.

As the scion, when united with the stock, becomes eventually the entire fruit-producing portion of the tree, it is impossible to over-estimate the importance of selecting the best scions—for as the scion is so will the tree be. This is a point that is often overlooked by Australian propagators, as in many instances the only care that is taken is to see that the scion is of the desired variety that it is wished to propagate, irrespective of the source from which the scion has been obtained; and this, in my opinion, is largely the cause of the deterioration that is taking place in many of our standard varieties of fruits, especially those of the Citrus family.

Thousands of fruit trees of various kinds are annually propagated from scions that are more or less valueless, as they lack one or more of the following qualifications, which should always be taken into consideration when selecting the scion:—

Always select your scions from a perfectly healthy tree, as many diseases are transmitted by the scion.

Always select your scions from a tree that produces heavy crops of the best fruit.

Always select your scions from trees that are good growers and that possess a vigorous constitution. Never select a scion from any tree that is poor in any way—either a poor or uncertain bearer, a poor, uneven, or weakly grower, that is subject to any diseases that are directly transmitted, such as gum, curl-leaf of the peach, or small leaf of the lemon, or that is badly attacked by any scale insect or fungus—as such trees are usually constitutionally weak, for the weaker the constitution of the tree the more liable it is to disease. As to the scion itself, if a graft, see that the wood is properly matured, or, if a bud, then that the bud is full—viz., properly developed—as immature grafts or buds rarely produce vigorous trees.

One of the great questions the Australian fruitgrower has to deal with at present is to find a market for a large quantity of inferior and medium quality fruits, but, despite this fact, nurserymen are annually propagating thousands of trees of absolutely worthless varieties—trees which when they come into bearing will only produce fruit of inferior quality; and instead of gradually diminishing the output of rubbish, and thus relieving our markets of this unsaleable fruit, our growers continue to plant trees for the produce of which there is no demand, nor is there any chance of their being any, as throughout the world the demand is for first-class fruit, no matter whether it is fresh, dried, canned, or otherwise preserved.

It is therefore to the interest of every fruitgrower in Australia to obtain and plant out only the very best trees; and to obtain the very best trees, it is essential that only the best varieties be propagated, and that the care I recommend as necessary should be taken in the selection of the stocks and scions that are to produce these trees.

The Development of New and the Improvement of Existing Varieties of Fruit.

With the exception of selecting chance seedlings that have shown some special qualifications, such as earliness, productiveness, lateness, or freedom from disease, and propagating the same by budding or grafting, no systematic attempt has been made to produce fruits that are especially adapted to Australian conditions, or even to systematically improve the existing varieties of fruits. In my opinion, this is a matter of such importance that it should be made an especial study by the various Departments of Agriculture throughout Australasia. I am confident that we can produce fruits that will be more suitable to our conditions, and that will be better adapted for the markets for which they are grown—be they local, interstate, or foreign—than those that are being commonly grown at present. California owes her position, as the premier fruit-producing country on earth, to the fact that her growers have developed types of fruit that are especially adapted to her conditions and to the markets which she supplies; and that she has grown these fruits only in such districts as are most suitable to the development of each individual variety. Here, on the other hand, our growers have done little if anything towards the development of special types; and as to their confining their attention to the variety or varieties of fruits that are best adapted to their individual soil or climate, it is often one of the last things they have thought of, their orchards being more often conspicuous for the number rather than for the excellence of the varieties grown.

In addition to selection, there is the important question of developing new varieties of hybridisation, and this particular work opens up such a wide field for experiment that good results can only be achieved as the outcome of many years of extremely careful work, so that it is a matter entirely outside the scope of the ordinary propagator or fruitgrower, but is the province of a specialist such as Luther Burbank, of Santa Rosa, California. This is a matter that belongs by right to our Agricultural Departments, as it is more a public than a private question, for, no matter how skilled the operator may be, the production of a new variety possessing distinctly valuable qualities, not possessed by any existing variety, is not accomplished more than once in many thousands of experiments. Still when such a hybrid has been produced it is a great acquisition to the fruit industry, and of more or less commercial value to it.

There is, as I have before stated, a wide field for conducting experiments in the hybridisation of fruits, as we have many varieties which, though of especial merit in some particular, are yet of no commercial value owing to some other cause. Thus a tree may produce a fruit of exceptional quality which it is extremely desirable to have in quantity, but it may be either a very poor bearer, a stunted weakly grower, or very liable to disease; so that if a hybrid can be produced possessing the exceptional qualities of the original variety without its drawbacks, it is a decided gain. Or, to take another example, we have a fruit that possesses every good quality except that it is a bad keeper and shipper, and we cross it with a fruit that is an exceptionally good keeper and shipper, and the resulting hybrid possesses the good qualities of both parents. Thus we have again produced a fruit that is a decided gain and of commercial value to the country producing it.

The development of new varieties specially adapted to Australian conditions can only be achieved by systematic hybridisation, but the existing varieties of fruits may be improved by careful selection.

In conclusion, I may state that I have written these few notes on the Propagation of Fruit Trees in the hope of drawing attention to what I have felt for some time—viz., the necessity for our producing nothing but the best and for stopping the propagation of the large number of worthless varieties of fruits of all kinds that are always more or less of a drag on our markets and an injury to the fruit-growing industry of Australasia.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, APRIL, 1923.

The twentieth egg-laying competition at the Queensland Agricultural College commenced on 5th April. During the early part of the period cold and bleak winds, with light showers, prevailed, much to the detriment of the health and egg-production of the competitors, notwithstanding the fine quality of most of the birds sent to compete. A few pens were sent too young, and others contained sick birds, which would have been better left at home, as they do not improve matters for their breeders. Some of them are already in moult. The majority of the competitors look well, and should make a name for their owners. The following are the individual records:—

Competitors.	Breed.	April.	Total.
LIGHT BREEDS.			
Jas. Hutton	White Leghorns	100	
*S. L. Grenier	Do.	94	
W. A. and J. Pitkeathly	Do.	87	
*C. H. Singer	Do.	86	
*Rock View Poultry Farm	Do.	80	
Beckley Poultry Farm	Do.	80	
*J. W. Newton	Do.	80	
*Oakleigh Poultry Farm	Do.	80	
*J. W. Short	Do.	78	
Jas. Harrington	Do.	77	
*O. Goos	Do.	77	
*N. A. Singer	Do.	77	
*W. and G. W. Hindes	Do.	75	
*R. C. J. Turner	Do.	74	
*Ancona Club	Anconas	68	
G. W. Rogers	White Leghorns	63	
*Mrs. R. Hodge	Do.	59	
C. Quesnell	Do.	56	
*Arch. Neil	Do.	55	
G. Marks	Do.	54	
*G. Williams	Do.	54	
F. Sparsholt	Do.	53	
Hall and Chapman	Do.	53	
*Mrs. L. Andersen	Do.	53	
W. and G. W. Hindes	Brown Leghorns	52	
*H. Fraser	White Leghorns	51	
*J. M. Manson	Do.	50	
Jas. Earl	Do.	46	
E. Ainscough	Do.	44	
*Bathurst Poultry Farm	Do.	44	
*A. C. G. Wenck	Do.	37	
*Mrs. E. White	Do.	31	
*H. P. Clarke	Do.	30	
W. Becker	Do.	30	
*C. A. Goos	Do.	25	
Parisian Poultry Farm	Do.	22	
N. J. Nairn	Do.	16	
J. Purnell	Do.	15	
HEAVY BREEDS.			
*W. Becker	Chinese Langshans	102	
R. Conochie	Black Orpingtons	84	
J. R. Douglas	Do.	81	
Beckley Poultry Yards	Do.	77	
*Mrs. A. E. Gallagher	Do.	73	

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	April.	Total.
HEAVY BREEDS—*continued.*			
*Jas. Hutton	Black Orpingtons ...	73	
*R. Burns	Do. ...	71	
*H. M. Chaille	Do.	67	
*E. F. Dennis	Do.	63	
*Jas. Ferguson	Chinese Langshans ..	60	
*R. Holmes	Black Orpingtons ...	59	
*E. Walters	Do.	58	
Mrs. A. Kent	Do.	51	
*Jas. Potter	Do.	51	
*J. H. Jones	White Wyandottes .	50	
W. T. Solman	Black Orpingtons ...	42	
H. B. Stephens	Do.	41	
*Parisian Poultry Farm	Do.	35	
*T. Hindley	Do. ..	35	
W. F. Ruhl	Do.	34	
V. J. Rye	Do.	33	
*Rev. A. McAllister	Do. ..	32	
W. G. Badcock	Ch. Langshans	26	
G. E. Rogers	Black Orpingtons ..	25	
*C. C. Dennis	Do.	15	
F. J. Murphy	Do.	10	
Mos. Stephens	Do.	0	
Jas. Ferguson	Rhode Island Reds ...	0	
Jas. Ferguson	Plymouth Rocks ...	0	
Total	...	3,554	

* Indicates that the pen is being single tested.

DETAILS OF SINGLE HEN PENS.

Competition.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
S. L. Grenier	14	17	16	17	16	14	94
C. H. Singer	16	22	13	6	11	18	86
Rockview Poultry Farm	12	19	14	14	12	9	80
Beckley Poultry Yards	16	9	10	15	14	16	80
J. W. Newton	14	17	16	2	14	17	80
Oakleigh Poultry Farm .. .	15	16	11	11	14	13	80
J. W. Short	13	12	12	18	16	7	78
O. Goos	11	16	16	12	8	14	77
N. A. Singer	12	20	18	12	7	8	77
W. and G. W. Hindes .. .	6	18	10	3	18	20	75
R. C. J. Turner	4	19	16	14	4	17	74
Ancona Club	11	15	14	4	7	17	68
Mrs. R. E. Hodge	2	10	3	17	19	8	59
Arch Neil	9	4	3	12	17	10	55
Geo. Williams	15	17	0	14	0	8	54
Mrs. L. Andersen	2	14	13	17	5	2	53
H. Fraser	10	8	9	11	5	8	51
J. M. Manson	3	7	10	14	7	9	50
Bathurst Poultry Farm	3	12	10	13	0	6	44
A. C. G. Wenck	5	0	5	9	5	13	37
Mrs. E. White	5	0	13	13	0	0	31
H. P. Clarke	12	0	7	0	5	6	30
C. A. Goos	0	16	7	0	0	2	25
N. J. Nairn	6	1	4	2	2	1	16
J. Purnell	3	0	2	3	4	3	15

EGG-LAYING COMPETITION—*continued.*

DETAILS OF SINGLE HEN PENS—*continued.*

Competitors.	A.	B.	C.	D.	E.	F.	Total.
HEAVY BREEDS.							
W. Becker	17	20	17	15	14	19	102
Mrs. A. E. Gallagher	16	18	5	16	17	1	73
Jas. Hutton	16	12	21	11	0	13	73
R. Burns	19	11	7	2	21	11	71
H. M. Chaille	8	16	18	16	0	9	67
E. F. Dennis	15	1	7	14	18	8	63
Jas. Ferguson	15	14	9	6	13	3	60
R. Holmes	13	3	19	3	12	9	59
E. Walters	18	19	0	8	6	7	58
Mrs. A. Kent	10	20	4	17	0	0	51
Jas. Potter	7	17	9	1	6	11	51
J. H. Jones	5	8	10	7	4	16	50
Parisian Poultry Farm .. .	0	0	5	5	6	19	35
T. Hindley	7	6	9	13	0	0	35
C. C. Dennis	4	6	0	5	0	0	15

CUTHBERT POTTS, Principal.

DARLING DOWNS COMPETITION.

The Darling Downs Egg-laying Competition is being held under the auspices of the Toowoomba sub-branch of the N.U.P.B.A., conducted by Mr. Chas. E. Smith on his premises in South street, Toowoomba. During April Mr. J. Maude, of New South Wales, judged the birds in competition for keenness to type, each bird being classed as first, second, or third type, and he also selected a champion from each section, these honours going to Mr. J. H. Jones for White Leghorn, Mr. D. H. Dipple for Black Orpington, and Mr H. Becker's Langshan for any other variety. The total number of eggs laid for the month was 1,736, an average of 16.07 per bird. The following numbers represent the birds that have not yet started:—Nos. 25, 26, 36, 39, 41, 42, 55, 59, 60, in the Leghorn section; Nos. 91, 92, 98, 99, 106, 118, 123, in the Orpington section; and Nos. 61, 65, 66, 69, 70, 72, 78, 80 of the A.O.V. section. Three birds suffering from temporary ailments have recovered and have been returned to their respective pens. Following are the individual scores for April:—

WHITE LEGHORNS.

1	J. Hutton	27
13	D. Dipple	26
10	G. W. and W. Hindes	25
51	A. H. Walker	25
15	R. Cole	24
6	W. Grant	23
14	D. Dipple	23
30	W. Cummings	23
37	Parisian Poultry Yards	23
56	Enroh Pens	23
16	R. Cole	22
48	H. Hansbridge	22
53	C. A. Keon	22
2	J. Hutton	21
34	Mrs. F. Bliss	21
44	P. J. Fallon	21
54	C. A. Keon	21
21	J. W. Short	20
11	S. Chapman	19

WHITE LEGHORNS—*continued.*

20	R. W. Shaw	19
29	W. Cummings	19
4	J. H. Jones	18
7	G. Stilton	18
33	Mrs. F. Bliss	18
38	Parisian Poultry Yards	18
52	A. H. Walker	18
8	G. Stilton	17
12	S. Chapman	16
24	J. Goggins	16
47	H. Mansbridge	16
46	R. Turner	15
9	W. G. and W. Hindes	14
17	G. Lawrenson	14
19	R. W. Shaw	14
50	A. R. Petty	14
5	W. Grant	13
18	G. Lawrenson	12
49	A. R. Petty	12
57	J. W. Newton	12
22	J. W. Short	11
27	E. Wiles	10
28	E. Wiles	7
58	J. W. Newton	7
43	P. J. Fallon	6
32	Jas. Taylor	5
31	Jas. Taylor	4
23	Jas. Goggins	4
40	Vic. Brand	3
3	J. H. Jones	1
35	H. Manning	1
45	R. Turner	1

ORPINGTONS.

121	Jas. Hutton	29
88	Marville Poultry Farm	27
90	W. Wilson	26
109	D. Dipple	26
112	T. J. Carr	26
95	T. C. Ollier	25
110	D. Dipple	25
111	T. J. Carr	23
132	H. B. Stephens	23
127	E. Walters	22
103	C. F. Dennis	21
113	Ken. Macfarlane	21
115	Cliff Lavers	21
117	Mrs. L. Maund	21
120	Parisian Poultry Yards	21
129	G. Radford	21
128	E. Walters	21
114	Ken. Macfarlane	20
122	Jas. Hutton	20
84	Wombo Poultry Farm	19
108	R. Holmes	19
116	Cliff Lavers	19
131	H. B. Stephens	19

ORPINGTONS—*continued.*

86	T. J. Moloney	18
97	R. Burns	18
83	Wombo Poultry Farm	17
85	T. J. Moloney	17
89	W. Wilson	17
96	T. C. Ollier	17
107	R. Holmes	17
87	Marville Poultry Farm	16
126	E. C. Dennis	14
125	E. C. Dennis	12
94	H. Mansbridge	9
100	Mrs. G. H. Kettle	6
105	R. Rivett	6
103	G. Radford	6
93	H. Mansbridge	5
101	R. W. Shaw	5
102	R. W. Shaw	4
104	E. F. Dennis	4
119	Parisian Poultry Yards	2
124	G. E. Rogers	1

ALL OTHER VARIETIES.

76	W. Becker, Langshans	27
73	H. Dibbs, Langshans	23
64	T. J. Carr, S.W.	22
68	R. W. Shaw, B.L.	21
67	R. W. Shaw, B.L.	20
82	C. G. Warrian, Rocks	20
63	T. J. Carr, S.W.	15
71	J. W. Allatt, Silver Camp.	15
74	H Dibbs, Langshans	9
75	W. Becker, Langshans	9
79	A. Le Pla, R.I.R.	9
62	Mrs. L. Maund, Col. W.	8
81	C. G. Warrian, Rocks	5
77	W. Paulsen, Rocks	1

THE NATIONAL UTILITY POULTRY BREEDERS' ASSOCIATION.

ALLOTMENT OF PENS, ZILLMERE COMPETITION, 1923-4.

WHITE LEGHORNS.

Pen Nos.	
1/2	Carinya Poultry Farm, Salisbury
3/4	T. H. Craig, Miriam Vale
5/6	P. J. Fallon, Brodribb street, Toowoomba
7/8	Oakleigh Poultry Farm, Sunnybank
9/10	R. C. J. Turner, Chamberlain street, Toowoomba
11/12	A. Neil, Cannon Hill
13/14	Enroh Pens, Pine street, Ipswich
15/16	W. J. Berry, Brickfield street, Lutwyche
17/18	A. W. Ward, Eskgrove street, East Brisbane
19/20	W. Witt, Villeneuve, Kilcoy Line
21/22	M. F. Newberry, Kedron Brook road, Wilston
23/24	Parisian Poultry Yards, Chamberlain street, Toowoomba
25/26	E. Stephenson, Bardon Poultry Farm, Paddington

WHITE LEGHORNS—*continued.*

27/28 H. T. Britten, Peary street, Northgate
29/30 G. and W. Hindes, Manly
31/32 H. Needs, Sunnybank
33/34 A. S. Walters, Doris street, Hill End, South Brisbane
35/36 J. T. Webster, Halaton, Bulimba
37/38 G. Williams, Salisbury road, Ipswich
39/40 J. Earl, Glenlossie, Kedron Brook road, Wilston
41/42 W. Wakefield, Soldier Settlement, Mount Gravatt
43/44 Kelvin Poultry Farm, Kelvin Grove
45/46 F. R. Koch, Cazna Poultry Farm, Laidley
47/48 R. D. Chapman, Montpelier street, Newmarket
49/50 J. Harrington, Aspley
51/52 Kidd Bros., Zillmere
53/54 H. Holmes, Hobart, Tasmania
55/56 G. Baxter, Lucknow road, North Ryde, Sydney, N.S.W.
57/58 H. Fraser, Rosewood
59/60 G. Scaletti, Mount Druitt, N.S.W.
61/62 Miss L. M. Dingle, Nudgee College Railway Station
63/64 S. Lloyd, Cornwall street, Thompson Estate
65/66 Robt. Duff, Waterworks road, Red Hill
67/68 J. and G. Green, Alma street, Clayfield
69/70 R. Shaw, Mayfield, Coorparoo
71/72 W. H. Forsyth, Willoughby, N.S.W.
73/74 A. Hodge, Kelvin Grove road, Brisbane
75/76 W. Shaffrey, Zillmere
77/78 W. Smith, Holmesbrook street, Grove Estate
79/80 W. Bliss, Forest Hill
81/82 J. E. G. Purnell, Annie street, Torwood
83/84 L. Andersen, Skew street, Sherwood
85/86 A. Cowley, Soldier Settlement, Enoggera

BLACK ORPINGTONS.

87/88 Parisian Poultry Yards, Chamberlain street, Toowoomba
89/90 Ken Macfarlane, Box 69, Toowoomba
91/92 Jas. Pryde, Chapel Hill, Indooroopilly
93/94 H. B. Stephens, Box 69, Toowoomba
95/96 Jas. Potter, Zillman road, Hendra
97/98 W. Shaffrey, Zillmere
99/100 S. Donovan, Murarrie
101/102 Enroh Pens, Pine street, Ipswich
103/104 L. Pritchard, Harte street, Chelmer
105/106 W. Smith, Holmesbrook street, Grove Estate
107/108 E. F. Dennis, Herston road, Kelvin Grove
109/110 T. Brotherton, Prince st., Thompson Estate
111/112 H. M. Chaille, Blinkbonnie, Esk
113/114 E. Walters, Lyon street, Moorooka
115/116 C. C. Dennis, Yeronga
117/118 E. C. Raymond, Brighton, Sandgate Central
119/120 J. Harrington, Aspley

OTHER VARIETIES.

121/122 Parisian Poultry Yards Toowoomba (Brown Leghorns)
123/124 J. Ferguson, Broadwater, Nanango (Anconas)
125/126 J. Ferguson, Broadwater, Nanango (Langshans)
127/128 A. S. Walters, Doris street, Hill End, South Brisbane (Barred Rocks)
129/130 R. A. Girling, Long Hill, Kelvin Grove (Black Minorcas)
131/132 W. H. Forsyth, Willoughby, N.S.W. (Silver Wyandottes)

A SUMMARY OF SOME EXPERIMENTS CARRIED OUT BY THE BUREAU OF SUGAR EXPERIMENT STATIONS.—VII.

The Director of Sugar Experiment Stations, Mr. H. T. Easterby, commenced this series in the May (1922) Journal, and in his opening article discussed deep cultivation experiments and tabulated comparative crop result from subsoiled and non-subsoiled fields. The second instalment, an account of results of irrigation experiments and the action of irrigation and manures upon the density and purity of sugar juices, appeared in the June (1922) issue. In the August number Mr. Easterby's notes covered experiments in fertilisation, and were followed in the succeeding issue by an account of distance experiments and resultant crops. In the October (1922) number the summary was continued with notes on the introduction and testing of cane varieties. In the February Journal experiments to determine if cane sets cut from arrowed canes have a prejudicial effect on the germination and subsequent yield were discussed. In his introduction to the Summary of Experiments above mentioned, the Director stated that a summary of the chemical work accomplished by the Bureau, to be prepared by Mr. George R. Patten, formerly Chief Chemist to the Bureau, would also be presented. Mr. Patten has now completed this summary, which entailed a great deal of elaborate work and occupied much time. The results will appear from time to time in the Journal until complete, when the whole summary will then be published in bulletin form.—Ed.

SOIL AND OTHER CHEMICAL ANALYSES.

Summarised by GEORGE R. PATTEN, Analyst, Agricultural Laboratory, Brisbane, formerly Chief Chemist, Bureau of Sugar Experiment Stations.

The average complete analysis of the soils of the sugar districts of Queensland presented in the following tables comprise all the sugar districts existing in 1904.

The magnitude of the analytical work entailed may be gauged by the fact that the number of soils analysed was 857. The sampling took a considerable time, as each sample consisted of four sub-samples totalling 3,428 sub-samples. For convenience of classification the sugar lands of Queensland were divided into three districts—viz., Cairns, Mackay, and Bundaberg—which were subdivided into sub-districts as follows:—

Series No. I. Cairns.—Mossman River, Cairns, Johnstone River, and Herbert River.

Series No. II. Mackay.—Burdekin Delta, Proserpine, and Mackay.

Series No. III. Bundaberg.—Bundaberg, Goodwood, Isis, Logan, Maryborough, and Moreton.

All this work was accomplished by the staff at the Sugar Experiment Station Laboratory, Bundaberg, during years 1901-1909.

The total analyses of the soil, together with agricultural analyses and plant food soluble in aspartic acid, is presented, the object of such analyses being to demonstrate in the first place the plant food immediately available, the acid soluble plant food which by process of weathering, &c., is gradually becoming available, and finally the analyses of the insoluble residue of the soils demonstrating the store of plant food locked up in the insoluble silicates which may in course of time gradually be added to the acid soluble plant foods.

Further tables appear including analyses of soils from Hatton in the Mackay district, and Rockhampton, and finally tables setting forth typical analyses of soil, solubility of plant food in various organic and mineral acids, and water capacity of the Queensland soils.

Subsequent tables present an interesting series of analyses from 1901 to 1922 of various fodders, analysis of the ash of sugar-cane, sugar-cane leaves, preserving action of chemicals on sugar-cane juice, experiments demonstrating comparison of the extraction of sugar from cane by the Laboratory Mill and sugar mill rollers. These experiments and analyses were carried out at the Sugar Experiment Station, Mackay, and at the Agricultural Laboratory, Brisbane, the results of the latter being supplied by courtesy of Mr. J. C. Brünnich, F.I.C., the Agricultural Chemist.

Attention is drawn to the low percentage of lime in the agricultural analyses in the districts from Mossman to Mourilyan, and the high magnesia ratio. The lime content is somewhat better on the Herbert River.

SERIES No 1.

CAIRNS (MOSSMAN).

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	76·23	..	..	..
Moisture	1·82	..	..	..
Combustible matter	6·52	..	6·64	..
Silica (SiO_2) (insoluble) ..	..	70·41	54·70	58·57
Silica (SiO_2) (soluble) ..	..	14·61	11·31	12·12
Phosphoric acid (P_2O_5) ..	·11	·06	·15	·18
Chlorine (Cl)	·004	..	·004	·004
Iron oxide (Fe_2O_3)	3·65	1·41	4·80	5·16
Alumina (Al_2O_3)	10·21	8·71	17·16	18·43
Lime (CaO)	·26	1·04	1·06	1·19
Magnesia (MgO)	·50	·26	·71	·75
Potash (K_2O)	·53	2·05	2·13	2·28
Soda (Na_2O)	·20	1·09	1·09	1·17
	100·03	99·64	99·75	99·85

Acidic elements in the soils .. .. 70·87 per cent.
Basic elements in the soils .. .. 28·98 per cent.
Total nitrogen in the soils .. .. ·127 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

——	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P_2O_5)	·0009	27
Lime (CaO)	·0659	1,977
Potash (K_2O)	·0137	411

KAMERUNGA (NEAR CAIRNS).

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	89·01	..	..	..
Moisture	·87	..	..	..
Combustible matter	3·55	..	3·58	..
SiO_2 (insoluble)	..	89·92	80·74	83·74
SiO_2 (soluble)	..	4·81	4·32	4·48
P_2O_5	·14	·13	·25	·26
Cl	·003	..	·003	·003
Fe_2O_3	2·34	·36	2·68	2·68
Al_2O_3	3·01	2·66	5·42	5·62
CaO	·17	·32	·45	·47
MgO	·24	·26	·47	·49
K_2O	·28	·79	·99	1·03
Na_2O	·15	1·19	1·21	1·26
	99·76	100·44	100·11	100·03

Acidic elements in the soils .. .. 88·48 per cent.
Basic elements in the soils .. .. 11·55 per cent.
Total nitrogen in the soils .. .. ·097 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

—	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P_2O_5)	·0014	42
Lime (CaO)	·0430	1,290
Potash (K_2O)	·0082	246

HAMBLEDON (NEAR CAIRNS).

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	80·25	..	..	..
Moisture	1·45	..	..	..
Combustible matter	5·33	..	5·41	..
SiO_2 (insoluble)	..	79·64	64·81	68·50
Sio_2 (soluble)	..	9·18	7·47	7·89
P_2O_5	·15	·09	·23	·24
Cl	·002	..	·002	·002
Fe_2O_3	4·45	·81	5·18	5·47
Al_2O_3	7·04	7·77	13·42	14·18
CaO	·28	·42	·62	·66
MgO	·33	·30	·58	·61
K_2O	·47	1·15	1·41	1·50
Na_2O	·17	1·15	1·11	1·07
	99·92	100·51	100·24	100·12

Acidic elements in the soils .. .. 76·63 per cent.
Basic elements in the soils .. .. 23·49 per cent.
Total nitrogen in the soils .. .. ·124 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

—	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P_2O_5)	·0013	39
Lime (CaO)	·0678	2,034
Potash (K_2O)	·0108	324

MULGRAVE (GORDONVALE) RED SOILS.

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	70·43	..	..	..
Moisture	1·98	..	..	..
Combustible matter	7·15	..	7·29	..
SiO_2 (insoluble)	..	64·12	46·06	49·66
SiO_2 (soluble)	..	20·65	14·83	15·99
P_2O_5	·22	·04	·26	·28
Cl	·002	..	·002	·002
Fe_2O_3	7·18	4·12	10·28	11·08
Al_2O_3	12·13	9·05	18·87	20·34
CaO	·32	·71	·84	·90
MgO	·34	·64	·81	·88
K_2O	·40	·49	·76	·82
Na_2O	·17	·50	·53	·57
	100·32	100·32	100·53	100·51

Acidic elements in the soils .. .. 65·93 per cent.
Basic elements in the soils .. .. 34·58 per cent.
Total nitrogen in the soils .. .. ·127 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

——	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P_2O_5)	·0009	27
Lime (CaO)	·1065	3,395
Potash (K_2O)	·0238	714

MULGRAVE (GORDONVALE) ALLUVIAL SOILS.

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	78·20	..	..	..
Moisture	1·78	..	..	..
Combustible matter	5·72	..	5·83	..
SiO_2 (insoluble)	..	77·02	61·31	65·09
SiO_2 (soluble)	..	10·94	8·71	9·24
P_2O_5	·16	·06	·21	·22
Cl	·002	..	·002	·002
Fe_2O_3	4·70	·64	5·30	5·62
Al_2O_3	8·17	8·46	15·05	15·98
CaO	·27	·88	·98	1·04
MgO	·42	·30	·66	·71
K_2O	·40	·84	1·03	1·10
Na_2O	·14	1·36	1·22	1·22
	99·96	100·50	100·30	100·22

Acidic elements in the soils .. .. 74·56 per cent.
Basic elements in the soils .. .. 25·66 per cent.
Total nitrogen in the soils .. .. ·113 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

—	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P_2O_5)	·0012	36
Lime (CaO)	·0972	2,916
Potash (K_2O)	·0100	300

GERALDTON (INNISFAIL) RED SOILS.

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	42·05	..	..	..
Moisture	4·23	..	..	..
Combustible matter	15·78	..	16·47	..
SiO_2 (insoluble)	..	82·09	36·05	43·15
SiO_2 (soluble)	..	10·17	4·47	5·34
P_2O_5	·27	·07	·31	·37
Cl	·005	..	·005	·005
Fe_2O_3	16·52	2·54	18·37	21·97
Al_2O_3	20·47	3·60	22·86	27·36
CaO	·08	·09	·12	·15
MgO	·20	·08	·24	·29
K_2O	·17	·24	·28	·34
Na_2O	·20	1·46	·85	1·02
	99·97	100·34	100·02	99·99

Acidic elements in the soils .. .. 48·86 per cent.
Basic elements in the soils .. .. 51·13 per cent.
Total nitrogen in the soils .. .. ·173 per cent.

AVAILABLE PLANT FOOD SLOUBLE IN ONE PER CENT. ASPARTIC ACID.

—	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P_2O_5)	·0006	18
Lime (CaO)	·0230	690
Potash (K_2O)	·0176	528

GERALDTON (INNISFAIL) ALLUVIAL SOILS.

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	56·07	..	..	..
Moisture	3·95	..	..	..
Combustible matter	11·94	..	12·43	..
SiO_2 (insoluble)	..	61·84	36·08	41·21
SiO_2 (soluble)	..	24·48	14·31	16·34
P_2O_5	·23	·06	·27	·31
Cl	·005	..	·005	·005
Fe_2O_3	8·34	1·29	9·44	10·78
Al_2O_3	18·47	9·23	24·62	28·12
CaO	·13	·09	·19	·22
MgO	·44	·13	·54	·62
K_2O	·26	1·26	1·01	1·15
Na_2O	·15	1·42	·99	1·13
	99·98	99·80	99·88	99·88

Acidic elements in the soils .. .. 57·86 per cent.
Basic elements in the soils .. .. 42·02 per cent.
Total nitrogen in the soils .. .. ·165 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

—	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P_2O_5)	·0006	18
Lime (CaO)	·0398	1,194
Potash (K_2O)	·0145	435

MOURILYAN.

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	57·23	..	..	..
Moisture	2·99	..	..	..
Combustible matter	11·93	..	12·20	..
SiO_2 (insoluble)	..	68·15	40·40	46·00
SiO_2 (soluble)	..	22·13	13·05	14·59
P_2O_5	·08	·13	·16	·18
Cl	·004	..	·004	·004
Fe_2O_3	8·71	·77	9·43	10·94
Al_2O_3	18·04	6·81	22·61	25·74
CaO	·20	·12	·28	·32
MgO	·43	·09	·49	·56
K_2O	·21	·81	·70	·79
Na_2O	·19	1·45	1·05	1·20
	100·03	100·46	100·37	100·32

Acidic elements in the soils .. .. 60·77 per cent.
Basic elements in the soils .. .. 39·55 per cent.
Total nitrogen in the soils .. .. ·164 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

—	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P_2O_5)	·0006	18
Lime (CaO)	·0311	933
Potash (K_2O_5)	·0137	411

HALIFAX (HERBERT RIVER).

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	79·13	..	..	..
Moisture	2·35	..	..	..
Combustible matter	5·62	..	5·76	..
SiO_2 (insoluble)	..	67·68	54·84	58·17
SiO_2 (soluble)	..	14·10	11·42	12·12
P_2O_5	·13	·05	·17	·19
Cl	·002	..	·002	·002
Fe_2O_3	3·93	·66	4·56	4·84
Al_2O_3	7·52	11·27	16·84	17·86
CaO	·49	·54	·94	1·00
MgO	·51	·44	·88	·94
K_2O	·24	2·59	2·36	2·50
Na_2O	·14	2·89	2·49	2·64
	100·06	100·22	100·26	100·26

Acidic elements in the soils .. .. 70·48 per cent.
Basic elements in the soils .. .. 29·78 per cent.
Total nitrogen in the soils .. .. ·112 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

—	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P_2O_5)	·0012	36
Lime (CaO)	·1035	3,105
Potash (K_2O)	·0138	414

INGHAM.

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	84·13	..	..	..
Moisture	1·67	..	..	..
Combustible matter	4·89	..	4·99	..
SiO_2 (insoluble)	..	75·00	64·16	67·52
SiO_2 (soluble)	..	9·38	8·02	8·44
P_2O_5	·14	·06	·20	·21
Cl	·002	..	·002	·002
Fe_2O_3	2·85	·46	3·29	3·46
Al_2O_3	5·43	9·72	13·84	14·57
CaO	·32	·65	·88	·93
MgO	·31	·53	·77	·81
K_2O	·19	2·33	2·19	2·31
Na_2O	·14	2·15	1·99	2·09
	100·07	100·28	100·33	100·34

Acidic elements in the soils .. .. 76·17 per cent.
Basic elements in the soils .. .. 24·17 per cent.
Total nitrogen in the soils .. .. ·087 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

——	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P_2O_5)	·0010	30
Lime (CaO)	·0508	1,524
Potash (K_2O)	·0121	363

RIPPLE CREEK.

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	79·46	..	..	..
Moisture	2·14	..	..	..
Combustible matter	5·83	..	5·95	..
SiO_2 (insoluble)	..	70·16	56·96	60·54
SiO_2 (soluble)	..	13·44	10·91	11·60
P_2O_5	·12	·14	·24	·25
Cl	·002	..	·002	·002
Fe_2O_3	3·97	·77	4·67	4·97
Al_2O_3	7·37	9·29	15·07	16·02
CaO	·46	·86	1·17	1·24
MgO	·51	·69	1·08	1·15
K_2O	·24	2·56	2·32	2·47
Na_2O	·13	2·50	2·17	2·30
	100·33	100·41	100·54	100·54

Acidic elements in the soils .. .. 72·39 per cent.
Basic elements in the soils .. .. 28·15 per cent.
Total nitrogen in the soils .. .. ·106 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P_2O_5)	·0009	27
Lime (CaO)	·0908	2,728
Potash (K_2O)	·0171	513

THE FARMERS' FURRED AND FEATHERED FRIENDS.

"The Animals and Birds Act of 1921."

The following particulars are published for general information:—

All wild animals or birds not named in the subjoined Schedules are totally protected during the whole year throughout Queensland.

SCHEDULE I.—ANIMALS THAT ARE NOT PROTECTED.

All introduced wild animals, including Fox, Rabbit, and Hare
All reptiles
Bandicoot (all species)
Bat or Flying-fox (all species)
Dingo
Kangaroo (all species, but not the Tree Kangaroo)
Native Cat (all species)
Paddymelon
Rat (all species)
Wallabies (all species)

BIRDS THAT ARE NOT PROTECTED.

Budgerigah or Shell Parrot
Cockatoo Parrot or Quarrion
Cormorant or Shag (all species)
Crow and Raven
Currawong or Scrub Magpie (Bell Magpie)
Galah or Rose-breasted Cockatoo
Goldfinch (introduced)
Indian Dove (introduced)
Indian Myna (introduced)
Long-billed Cockatoo or Corella
Rosella Parrot (all species, including Crimson Parrot)
Sparrow (introduced)
Starling (introduced)
White Cockatoo (all species)

SCHEDULE II.—BIRDS PARTIALLY PROTECTED.

Brush or Scrub Turkey
Bustard or Plain Turkey
*Coot (Redbill, &c.)
*Emu
Finch (all native species except Painted or Gouldian Finch)
Goose and Duck (all species, excluding Black Swan)
King Parrot
Lorikeet or Honey Parrot (all species)
Native Hen
Pigeon and Dove (all wild species, except "Squatter" and "Whampoo")
Plover
Quail (all species)
Redwing Parrot
Ringnecked Parrot
Sea Curlew and Sandpiper

In District No. 1 (South Queensland), from the first day of September in each year to the thirty-first day of March in the following year, inclusive.

In District No. 2 (North Queensland), from the first day of December in each year to the thirty-first day of May in the following year, inclusive.

*Provided that for Emus on prickly-pear infested land, and Coots in Northern Sugar Districts, the Close Season shall be from the first to the seventh day of July in each year, inclusive.

LIST OF SANCTUARIES WITHIN WHICH THE DESTRUCTION OR CAPTURE OF NATIVE BIRDS OR ANIMALS (WHETHER PARTIALLY PROTECTED OR OTHERWISE) IS PROHIBITED DURING THE WHOLE YEAR.

Archer (property of H. M. Jones)
Barambah Creek
Barron Falls (National Park)
Barron Shire (roads, reserves, and unalienated lands in the Shire of Barron)
Bellenden-Ker (Reserve for Native Fauna)
Blue Mountain Holding, Mackay
Boonara
Bowen (Denison Park)
Bribie Island
Bunya Mountain (National Park)
Burdekin Weir
Cabbage Tree Creek Reservoir and Catchment Area
Calliope River (Water Reserve)
Calliungal (Water Reserve R. 38)
Capricorn Group of Islands
Charters Towers (Reeve's Lake, part of Lolworth Creek, Reed Beds, and La Batt's Lake)
Chelmer Recreation Reserve
Coochie-Mudlo
Cressbrook
Doonela Lake
Dugandan (property of Mr. McConnel)
Eagle Junction (Kalinga Park)
Eidsvold Camping and Water Reserve
Emu Park (Town of Emu Park)
Enoggera Reservoir and Catchment Area
Etheridge Goldfield (Cumberland Dam)
Flaggy Creek Timber Reserve
Gold Creek and Moggill Creek Drainage Area
Gooburrum Shire (roads, reserves, and unalienated lands)
Gracemere (R. S. Archer's property)
Great Keppel Island
Hamilton Golf Links
Hinchinbrook, Barnard, Raine, Eva Islet, Agnes Islet, Channel Rock, Goold and Garden Islands
Hornet Bank (W. C. Mayne's property)
Houghton River (Horseshoe Lagoon)
Jarvisfield (Church Lagoon)
Jarvisfield (Sheep Station Creek)
Jarvisfield (Red Lily Lagoon)
Jordan Goldfield (3,600 acres)
Kuranda (Monamona Mission)
Lake Clarendon
Lake Murphy
Lamington National Park
Mackay Town (roads, reserves, and unalienated lands)
Mackay (Denman's Waterhole)
Mackay (Orphanage Swamp)
Magnetic Island
Malanda (J. English's property)
Malanda (swamp of 160 acres)
Maleny (properties of A. J. Thynne, A. Marshall, and A. W. Thomason)
Manumbar and Kilkivan (Timber Reserve)
Mareeba (Pasturage Reserve)
Maroochy Shire
Mount Cooroy and Inlet, Noosa River
Mount Coot-tha Reserve
Mount Glorious (G. Lee's property, near summit)
Mount Morgan—Dee River (Mount Morgan Gold Mining Company's property)
Mud Island
North Keppel Island
Nudgee Waterhole
Peel Island
Pentland Town Reserve
Point Danger (foreshores of ocean two miles back from portion 2, parish of Gilston, to Point Danger)
Pumice Stone Channel
Redcliffe Shire
Rewan Stud Farm for breeding Police horses
Rockhampton (Jardine's Lagoon)
Rockhampton (Murray's Lagoon)
Rockingham Bay (the islands therein)
Seaforth and adjacent islands
Stradbroke Island
Stuart River
Taylor, parish of (W. Gutteridge and W. E. Hammond's properties)
Taroom (Tualka Creek Water Reserve)
Tingalpa Shire
Toowong (Sir R. Philp's property, Toowong Sports Ground, and adjoining land)
Toowoomba (Jubilee Park)
Toowoomba (One-tree Hill)
Toowoomba (Picnic Point)
Toowoomba (Redwood Park)
Toowoomba Rifle Range
Townsville (Abattoir Reserve)
Townsville, county of Wilkie Gray, parish of Hinchinbrook (Wm. Young's property)
Townsville (German Garden Lagoons and adjoining swamps)
Townsville (Pink Lily Lagoon)
Valley of Lagoons Holding
Wynnum, Town of
Widgee Shire
Yaamba (late P. F. Macdonald's property)

GENERAL PROVISIONS.

Offences against the Act, for which severe penalties are provided, include—

Trapping or dealing in native birds or animals without a license. A trapper's license costs 5s., and a dealer's license 10s. They may be taken out at the office of the nearest Clerk of Petty Sessions.

Capturing or killing a partially protected wild bird or animal during the close season.

Capturing or killing a totally protected wild bird or animal at any time.

Capturing or killing a totally protected or partially protected wild bird or animal at any time in a sanctuary.

Interfering with any notice under this Act.

Taking the eggs of any protected or partially protected bird.

Using poison for killing Opossums or Native Bears.

Using acetylene lamp or similar torch in the killing of Opossums or Native Bears.

The following are the maximum numbers one individual shooter can kill in any one day:—

Wild Ducks	20
Wild Geese	10
Quail	25
Pigeons (except Squatter and Whampoo)	10
Plain Turkeys	2
Scrub Turkeys	2
Plovers	10

FRUIT FLY CHECKED BY COLD STORAGE.

An Interesting Experiment Produces Highly Satisfactory Results.

In order to determine the possibility of destroying the larvæ and eggs of fruit flies present in fruit grown in the Stanthorpe district, some twelves cases of apples were placed in cold store in Brisbane on the evening of the 26th March. Samples of these fruits were submitted daily to the Government Entomologist and Pathologist, with the exception of the period embraced by the Easter holidays, and the following is a precis of a report submitted by Mr. Henry Tryon, Government Entomologist, to the Fruit Branch respecting same:—

"Of the apples placed in cold storage, 34 per cent. manifested fruit fly infestation. This infestation was represented exclusively by insects either in the egg phase of life or by young maggots 1 to 1½ mm. in length that had recently hatched from eggs. These insects survived and grew slowly until at least the expiration of two or three days with augmented damage, but seldom if ever attaining the degree to render the fruit unsaleable. They had, however, all died at a date between 30th March and 5th April, indicating that the duration of the cold storage necessary to destroy them was not less than four days or more than eight days. The temperature of the cold store fluctuated from 34 to 42 deg. Fahr. As a result of this experiment it is proved that fruit fly larvæ infested fruit and fruit fly damage in fruit may be brought to a standstill by cold storage for a period of less than ten days, possibly much less." The results obtained are highly satisfactory, as in the opinion of the officers of the Fruit Branch it will now be possible to prevent much of the serious damage that takes place in the case of such apples as Gravenstein if they are placed in cold store in the earlier stages of their infestation, and fruits so treated will not deteriorate to any extent and meet with a ready local sale.

A CORELESS APPLE—AN AMERICAN DISCOVERY.

Apples without cores or seeds are promised by a discovery announced at Abbotsford, Canada. According to the announcement, a seedless and coreless variety of Fameuse apple has been developed, which differs but slightly in shape from an ordinary Fameuse by being longer, and flatter at the ends, but with the typical colouring and flavour. Except for a slight marking on the flesh, which outlines the situation of the core in an ordinary apple, there are neither core nor seeds. The apples were developed in an orchard at Abbotsford, and the discovery that they were out of the ordinary was an accident. They had come from a new block of Fameuse about eight years old, bearing for the first time in market quantities. The discovery was made while grading for market, but unfortunately no record was kept of the tree or trees producing the new fruit, and it will not be before another harvest that steps can be taken for its commercial development.

NEW WHEAT TRIALS.

SUMMARY OF RESULTS—SEASON 1922.

For a number of years the Department of Agriculture and Stock has carried on a system of wheat-breeding and selection for the purpose of improving existent varieties. Good work has been accomplished in the last decade, particularly at the Roma State Farm, where Mr. R. E. Soutter carries on the duties of plant breeder and manager. As a result of carefully designed work a number of new strains of wheat have been evolved, and the practice was followed of testing these under field conditions at the State Farm, also throughout the main wheatgrowing districts in the State.

Co-ordinated work of this description between the plant breeder and field officers of the Department has resulted in the segregation of a number of promising strains of wheat, which show unmistakably that they possess certain field characteristics markedly superior to those commonly found in varieties now in general cultivation.

Concurrently with the field trials in different districts, milling tests were carried out by the Agricultural Chemist to determine the nutritive and flour-yielding qualities of the varieties selected under the improvement system, in order that nothing but the best might be brought into cultivation. It is to be generally conceded that many of the varieties of wheat in cultivation throughout the State could be improved, and that the elimination of varieties such as these would have an effect of engendering a greater feeling of security in wheatgrowing as an occupation if other and superior kinds could be grown in their place.

To secure the co-operation of wheatgrowers, a scheme was outlined by this Department and put before the growers' representatives on the Wheat Board, who unanimously decided to adopt the system of the classification of the State into districts and the allotment thereto of varieties to suit representative soils and conditions common to the respective localities.

The next step decided upon was the active co-operation of members of the Wheat Board and officers of the Department of Agriculture in respect to the selection of sites in different districts where the season's trials could be carried out. Provision was also made that seed wheat from the resultant crops should be made available to the grower and the surplus employed for extending the cultivation of the particular variety, the Wheat Board in this latter connection undertaking to carry out a system of cleaning and grading the grain at their central depôt near Toowoomba.

It is generally recognised that considerable reduction could be effected in the number of varieties of wheat in general cultivation, which are said to exceed three score in number. Standardisation of types of Queensland-grown grain is being aimed at, so that only those varieties conforming to same may be eventually grown on a commercial scale. Last wheat season proved to be a dry one; in fact, the wheats under review were grown on a rainfall ranging from a minimum of 1 inch to a maximum of 4 inches, experienced during the growing season.

Another factor operating against the success of the wheat trials was the fact that good rains for germinating the seed were not experienced at the ordinary sowing season, and planting operations were in consequence delayed fully a month.

The undermentioned record of yields was obtained by the Department from growers:—

48	acres of	"Roma Red No. 2"	averaged	27	12/60	bushels pr. ac.	
36	"	" "Cedric No. 2"	"	25	43/60	"	"
163	"	" "Warchief No. 2"	"	22	22/60	"	"
73	"	" "Roma Red No. 5"	"	21	37/60	"	"
134	"	" "Novo No. 5"	"	21	24/60	"	"
69	"	" "Roma Red No. 7"	"	20	37/60	"	"
Total 523	acres.		Averaged	22	32/60	"	"

PLATE 100.—A COTTON FIELD AT PULLEN VALE, NEAR BRISBANE. MR. HUGH McMARTIN'S PLANTATION.

PLATE 101.—COTTON ON MR. E. ARNDT'S FARM, THORNTON, LAIDLEY.

PLATE 102.—CATTLE ON THE BURNETT, NEAR GAYNDAH.

PLATE 103.—MR. HARRY LEGGATT, A REID'S CREEK (GAYNDAH) PIONEER, AND THE WAGGON WITH WHICH HE OVERLANDED FROM ADELAIDE NEARLY FORTY YEARS AGO.

Plate 104.—A Burnett Cotton Crop.
Mr. Thos. Gishford's Farm on Barambah Creek, near Gayndah.

Plate 105.—The Bountiful and Beautiful Burnett.
Outlook from Northern Escarpment, Binjour Plateau.

THE PINEAPPLE TRADE—CAUSE OF DAMAGE—CARELESS HANDLING.

During recent years pineapple production in Queensland has increased to a very marked extent and large quantities of the fruit are sent to the Southern markets. Unfortunately, the pineapples often arrive in New South Wales in very bad condition, and whilst recently in Sydney, Mr. W. Rowlands, Queensland Government Packing Instructor, had his attention drawn to the matter. He has now reported to the Department of Agriculture and Stock as follows:—

"It was pointed out to me by those dealing with pineapples that for the last eight years this fruit has been arriving in more or less bad condition, especially during February, March, and April of each year, and so far nothing has been done to remedy the trouble. Agents stated that growers doubt their word when informed of the condition of their pineapples on arrival. On inquiry I ascertained that between 400 and 500 cases weekly are lost in repacking, and as pineapples in good order are realising 10s. to 11s., the loss to Queensland growers has been considerable. One Sydney agent estimates his loss at £60 weekly. Through the courtesy of several agents who handle pineapples I was given assistance to open every consignment for my inspection, and out of thirty lots three consignments only opened up in perfect condition. On close examination I was able to see that the pineapples in good order had been cut from the plant, while the bad conditioned pines had been broken off. My conclusion was that the pineapples arriving in good condition had been cut from the plants with ½-inch stems; on the other hand fruit arriving in bad order had been broken off and handled carelessly.

"I at once telegraphed to Mr. G. Garrad, of Woombye, to send pineapples with longer stems and to cut them. Mr. Garrad replied that he was forwarding some cases as usual and some as I suggested. This fruit was examined by me on arrival, and it was found that the pineapples with long cut stems were in perfect order. while the pineapples sent as usual were in very bad order indeed. Since, several other consignments cut as suggested have arrived in good order. A Woombye grower in Sydney stated that it was not usual in his district to cut pineapples, but to break them off. He has returned determined to cut all pineapples in future.

"My opinion is that when growers are breaking off pineapples they injure the centre of the fruit and immediately decay sets in. It is common to see half green pineapples rotten at the base. I would suggest that all pineapple growers be notified to cut pineapples with at least ½-inch stem and not to break them off under any consideration; to handle all pineapples for interstate trade as carefully as possible, and not to 'bulge-pack' this fruit."

PLATE 106.—A PULLEN VALE FALLING, NEAR INDOOROOPILLY, BRISBANE.

PLATE 107.—A PRIZE-WINNING EXHIBIT, ROYAL AGRICULTURAL SHOW, SYDNEY. 1923.

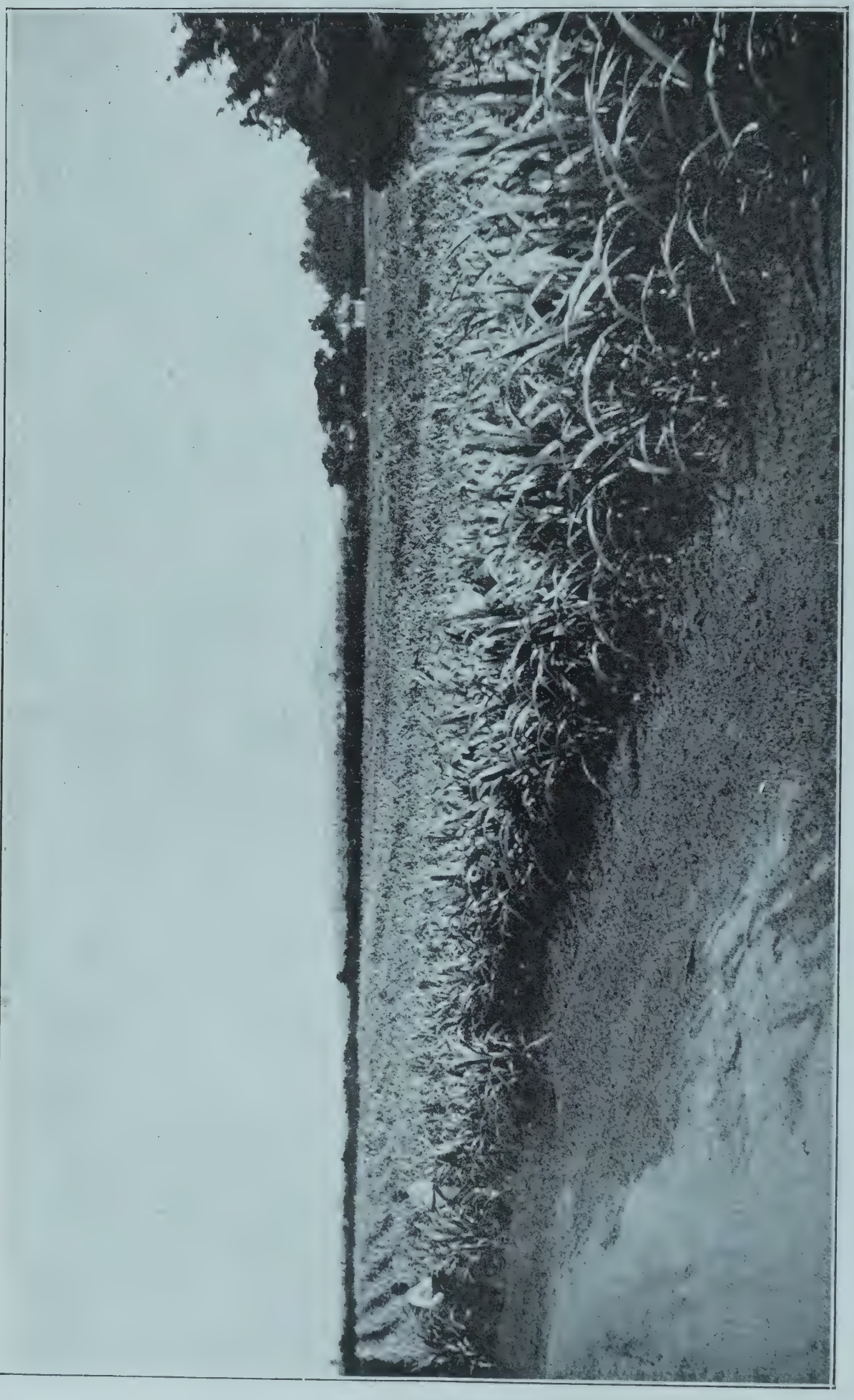

PLATE 108.—PLANT CANE, SUGAR EXPERIMENTAL STATION, MACKAY.

General Notes.

Native Bears and Opossums.

A notice has been published extending the close season for native bears and opossums until the 31st May, 1923. It is, of course, possible that this close season may be still further amended or extended.

Departmental Appointments.

The resignation of James M. Gibson as Cangrowers' Representative on the Racecourse Local Sugar Cane Prices Board has been accepted, and Robert S. Stevens has been appointed in his stead. Mr. F. C. Henk, of Palmwoods, has been appointed an Honorary Inspector under "*The Diseases in Plants Act of* 1916."

Fruit Industry—Lantern Slide Lectures and Fruit Packing Classes.

Fruitgrowers of the North Coast districts are now receiving a good deal of attention by way of horticultural education. The Chief Instructor in Fruit Culture (Mr. J. M. Ward) has been visiting a number of the fruit districts and delivering lantern slide lectures, and giving practical advice to individual orchardists. The chief subjects dealt with included the judicious selection of approved stocks and buds from proved productive trees producing the correct type of fruit; cultivation; manuring; agricultural education; organisation. Each subject was admirably illustrated with lantern slides. The lectures are being extended throughout the various fruit centres.

At the end of some of the lectures demonstrations were given by the Government Packing Expert (Mr. W. Rowlands) in packing oranges into the case to be adopted next year; the dimensions of the case in question are 20 inches long by 11½ inches wide by 10 inches deep (inside measurements). All who saw the case packed expressed satisfaction with it.

Packing classes for school children are to be conducted throughout the fruit season. The first of these was started at Buderim on 8th May, and was to be followed by others at Palmwoods, Mapleton, Nambour, Woombye, Montville, Yandina, and other centres. Growers are giving practical assistance to this class of instruction by way of finding packing sheds, fruit, cases, &c., and otherwise giving the subject their general support. After the students have packed the fruit it will be ready to be shipped to any market. Between forty and fifty of such classes have been in active operation in Tasmania during the past three years, and have proved most successful, and there is every reason to consider they will be of equal success in Queensland.

A Warwick Mill and the State Wheat Board.

In the "Courier" of the 17th instant a paragraph appeared, emanating from Warwick, relating that the Warwick Co-operative Farmers' Milling Company, having worked almost continuously for over two years, had now been compelled to reduce operations to one shift, and laying the responsibility for this upon the State Wheat Board. It was also stated that existing regulations were in favour of the Brisbane mills, which were obtaining wheat at 5s. 3d. a bushel compared with the Board's price of 6s. 5½d. a bushel. Further, a charge was made that the Brisbane mills could lay down flour in Warwick at 30s. a ton cheaper than the local article.

The Acting Minister for Agriculture, Mr. Huxham, communicated with the Wheat Board immediately the paragraph appeared, and the Board characterises as absurd and without foundation the statement that flour could be laid down in Warwick at 30s. a ton cheaper than the local article.

That the Brisbane mills are handling large quantities of Southern wheat at 5s. 3d. a bushel is not a fair way of stating the matter. The price quoted is the New South Wales price, and to it has to be added freight by sea, handling, and other charges—which would bring the State Wheat Board's price of 5s. 8d. a bushel, not 6s. 5½d. as stated in the article, in favourable comparison with Southern prices. As a matter of fact, the Warwick Farmers Milling Company had been allotted by the State Wheat Board more than its quota out of the wheat available from the last harvest.

Sugar Assessment.

An Order in Council under "*The Regulation of Sugar Cane Prices Acts,* 1915 *to* 1921," has been issued to the effect that the assessment to be levied on every ton of sugar-cane received at any mill on and after the 11th May, 1923, is fixed at 2d. per ton. Further, the Minister has levied an assessment at the rate of ½d. per ton on every ton of sugar-cane received at sugar-works during the season 1923-24 under "*The Sugar Experiment Stations Act of* 1900."

The Pink Boll Worm.

The same report states that the pink boll worm (*Pectinophora gossypiella* Saunders) of cotton is even more dangerous as a cotton pest than the cotton boll weevil, and is reported as occurring in small areas in Texas, Louisiana, and New Mexico. Accidentally introduced into the Southern States, it is adding to the difficulty of producing cotton in States already infested with the boll weevil. The Federal Horticultural Board has undertaken eradication measures in co-operation with the States concerned. Quarantines, both State and Federal, have been issued and effectively enforced. California Quarantine Order No. 39 applies to pink boll worm as well as to cotton boll weevil.

The Cotton Boll Weevil: Its Spread in American Cotton Country—How California Keeps Free.

In the report of the Bureau of Plant Quarantine (Third Report of the Californian Department of Agriculture, Monthly Bulletin, November-December, 1922) the history and habits of the cotton boll weevil (*Anthonomus grandis* Boh.) are briefly discussed. Discovered in two counties in the southern end of Texas in 1894, the weevil has now become established in every southern cotton-growing State, where the damage is estimated to be well in excess of 200,000,000 dollars annually. During the year 1921 the insect spread to 66,661 square miles of new territory, and since in Arizona there is a variety of cotton boll weevil (*Antonomus grandis* var. *thurberiæ*) infesting wild cotton in the mountainous regions, California is the only cotton-growing State in the Union free from every form of cotton boll weevil. This position is being strenuously maintained. A strong and drastic Quarantine Order (No. 32) is being rigorously enforced, and this is assisting materially in preventing an incursion of the cotton boll weevil into California.

How to Pick a Layer and Breeder.

Mr. W. Hindes, of Manly, lectured very informatively before a meeting of the National Utility Poultry Breeders' Association recently. White Leghorn and Black Orpington pullets were used for purposes of demonstration. In each case, one bird was a very good and the other a poor specimen of the breed, and this enabled the lecturer to compare good and bad points in each breed. The lecturer commended the trap-nesting method of testing layers, as the initial expenditure in erecting single-test pens limited the volume of work considerably. Continuing, the lecturer said that heavy egg-production was an inherited factor, the male bird must be prepotent. To prove whether the bird had this characteristic it was necessary to wait for some time until the progeny had been tested. If results were satisfactory the bird could then be used for three or four more seasons. In Mr. Hindes's opinion it is a grave error to follow the practice of many breeders by discarding the male bird after the first season. After a little experience, the lecturer stated, it became almost an instinct to pick layers as they pass in front of one. Handling and measuring could then be resorted to, if desired, merely to confirm one's opinion. The characteristics to look for were found first in the head and eye and then in body conformation. Of course, vigour and capacity were absolutely necessary. Mr. Hindes's observations proved that the best layers were usually a little flat breasted and flat sided, but very deep behind. He did not like a bird pinched towards the abdomen or narrow across the back. The vitality of a flock must be retained if heavy egg production is desired. This can be done by mating a slightly larger female than one would select for a laying competition with a fair or medium-sized cockerel from the fastest layer procurable. The lecturer liked fine texture in comb, which should not be too large or too thin. If the latter, the combs in the male progeny would be liable to droop over on one side. Birds with extra long and fine pelvic bones, he considered to be lacking in stamina. They might lay well for say fifteen months, while birds with stouter pelvic bones, other things being equal, he found, laid well for three or four seasons. Straight pelvic bones are desirable.

Agricultural Education—Activities of the Queensland University.

On 9th August, 1916, on the motion of Mr. J. D. Story, the senate of the University carried a resolution that, as the question of the primary industries is closely interwoven with post-war problems and a good system of agricultural education will be helpful in the development and expansion of the primary industries of Queensland, it is desirable that agricultural education should be carefully organised and developed.

The senate at the same time appointed a select committee, under the chairmanship of Mr. Story, to inquire into and report upon the whole question of agricultural education.

The committee, in its report, dealt exhaustively with the types of employers and employees who would be benefited by a systematic training under a suitable scheme of agricultural education, and also with the benefits which would accrue to the State as a whole. In its conclusions, the committee commented favourably on the work which was then being done in the recently established rural school at Nambour, and strongly recommended the establishment of similar schools in other agricultural centres as a first step towards a general scheme of agricultural education for the State. The committee also recommended that steps should be taken as early as practicable to organise the work of higher agricultural education on a diploma course basis, which would lead ultimately to the development of a full degree course in agriculture. However, in the absence of funds for the purposes, the senate has not been in a position to take any practicable steps towards that end. Recent developments in regard to the agricultural activities of the State have again revived the question, and the investigations made by Mr. Story during his visit to California towards the end of last year have proved that the recommendations of the select committee were substantially sound, and that a comprehensive system of agricultural education should form an inseparable part of any scheme for the expansion of these industries.

At the first meeting of the senate after his return to Queensland Mr. Story submitted a memorandum emphasising the need for the suitable training of future agriculturists, instructors, researchers, and leaders of the industry generally. He also advocated suitable provision for scientific investigation and research. His recent inquiries in California showed that a Department of Agriculture is regarded as a very desirable department in a University, particularly in a State which is mostly dependent upon the primary industries. They also showed that to enable a University to deal satisfactorily with the educational and research work of agriculture an area of not less than 600 acres was required, and that such an area, if it cannot be actually part of the University domain, should be within forty-five minutes' journey by conveyance of the University.

Finally, the following resolutions (amongst others) were carried by the senate:—

(*a*) That the memorandum submitted by Mr. Story on the question of the organisation and development of agricultural education in Queensland be received and particulars contained therein noted.

(*b*) That, seeing that it is not practicable at the present time to establish a Faculty of Agriculture or a Department of Agriculture, steps be taken as soon as possible for the institution of a Diploma of Agriculture.

(*c*) That a survey be made as to the directions in which the research work of the University could be extended so as to include those matters of economic importance to the primary industries, and concerning which work is not being done by the Commonwealth Institute of Science and Industry.

(*d*) The possibility of co-operation with the Council of Agriculture, with a view to the council's assisting financially in regard to research work which the council might ask the University to undertake.

(*e*) That a committee, consisting of Professor Richards and Professor Goddard (of the University staff), Mr. Riddell (assistant chief inspector), Mr. F. C. Thompson (principal of the practising school), and Mr. Hamlin (who succeeds Professor Johnston as officer in charge of the prickly-pear experimental station), be appointed to inquire into and report upon the whole question of the establishment of a Diploma of Agriculture.

(*f*) That a site of sufficient area for the practical work of a Faculty of Agriculture be secured as soon as possible.

Seed Cotton—Further Encouragement to Growers.

In January last an announcement was made that, for the year ending the 31st July, 1924, the advance to be made by the Government for seed cotton delivered at the nearest ginnery, or as might be otherwise arranged, would be, for seed plant cotton of good quality free from disease and defects, of 1¼-inch staple, 5½d. per lb., and for less than 1¼-inch staple, 4½d. per lb. The advance to be limited to areas not exceeding 50 acres.

The Minister for Agriculture (Hon. W. N. Gillies) now desires to make it clearly known to growers that the Government, owing to the drought and the consequent circumstances of the industry, has decided to make the advance for the year ending the 31st July, 1924, as follows:—

For seed plant cotton of good quality, free from disease and defects, of 1¼-inch staple	5½d. per lb.
If of lesser staple than 1¼ inch	5d. per lb.

The other conditions issued in January last in relation to the advance to remain.

Thus it will be seen that growers will, owing to this decision of the Government, be in a better position to make their arrangements for the coming planting. No alteration has been made in relation to the advance for seed cotton of 1¼-inch staple, and for seed cotton of lesser staple the advance has been increased by ½d. per lb. over the January conditions, and the encouragement thus given should ensure an area under cotton that will be considerably in excess of the area planted in 1922-23, with a great increase in the harvest, if there is an improvement in the season on that of last year that can be reasonably looked for.

The Bacon Industry on the Downs.

As an illustration of the progress of the bacon industry on the Downs, it is stated that last year the Downs Co-operative Bacon Company treated 31,842 pigs, of which 31,386 were baconers. Since the inception of the factory £1,250,000 has been realised on transactions, while the farmers have received over £1,000,000 from the factory for swine.

FORTHCOMING SHOWS.

Murgon: 17th and 18th May.
Wallumbilla: 22nd and 23rd May.
Ipswich: 23rd and 24th May.
Kilkivan: 23rd and 24th May.
Springsure: 23rd and 24th May.
Beaudesert: 29th and 30th May.
Marburg: 2nd to 4th June.
Mackay: 4th to 7th June.
Woombye: 20th and 21st June.
Lowood: 22nd and 23rd June.
Rockhampton: 21st to 23rd June.
Ithaca: 29th and 30th June.
Kilcoy: 28th and 29th June.
Woodford: 11th and 12th July.
Wellington Point: 14th July.
Caboolture: 19th and 20th July.
Mount Gravatt: 21st July.
Barcaldine: 24th and 25th July.
Rosewood: 25th and 26th July.
Pine Rivers: 27th and 28th July.
Crow's Nest: 31st July and 1st August.
Sandgate: 3rd and 4th August.
Brisbane Royal National: 6th to 11th August.
Belmont: 18th August.
Wynnum: 31st August and 1st September.
Zillmere: 8th September.
Laidley: 13th and 14th September.
Beenleigh: 20th and 21st September
Rocklea: 22nd September.
Toombul: 28th and 29th September.
Kenilworth: 4th October.
Ascot: 24th October.
Pomona: 21st and 22nd November.
Millaa Millaa: 23rd and 24th November.

Answers to Correspondents.

The Use of Arsenic as a Grass Killer on Tennis Courts.

J.E.M. (Garget, Mackay)—

The Agricultural Chemist, Mr. J. C. Brünnich, states that arsenic will not kill the grass permanently, and the treatment will have to be repeated about once a year. Ten pounds of arsenic dissolved with 3 lb. of caustic soda will only make about 50 gallons of spray. Diluting it to 200 gallons would make far too weak a solution. There is no danger to health from the fumes on the court, but horses or cattle might lick the soil or eat the killed grass, and should therefore be kept off.

Hide Tanning.

J.R.C. (Goranba)—

The Director of Agriculture (Mr. H. C. Quodling) advises—

All vessels used in connection with tanning operations should be of wooden or other non-metallic substances. Hides may be tanned either freshly, flayed, or in a salted condition, but stored hides should be kept from heating.

To dehair hides.—Take 6 to 8 lb. of freshly burnt lime in a half-barrel and gradually slake; when slaked add up to 2 gallons of water. Shake the hide to remove all salt, trim thoroughly; and, if of large size, split down the back to facilitate handling. Soak hide, flesh side out, in clean water, suspending the hide on sticks for two or three hours, stirring frequently. After soaking, lay them on a beam hair side up; scrape and scrub well; reverse and remove all flesh off it. Scrape well with the back of a butcher's knife; resoak. Greenhide requires twelve to fourteen hours and salted hides twenty-four to forty-eight; scrape again with a butcher's knife. A "beam" consists of a piece of timber about 2 feet wide and 8 feet long, planed and placed in a sloping position from waist high to about 12 inches above the ground.

Place lime water prepared as above in the barrel previously used for soaking the hide and nearly fill with water; immerse the hides in this till the hair will rub off easily with the palm of the hand. Keep the solution frequently stirred and covered.

Place the hide on the beam and scrape off all hair; if sufficiently soaked a cheesy or curly layer will rub off with the hair. Scrape flesh side as well to remove as much lime as possible. Soak the hide in a barrel of water, to which has been added 9 oz. of 22 per cent. tannery lactic acid or half a gallon of vinegar; soak for twenty-four hours; wash with clean water and soak over night.

The tanning solution should be prepared fifteen or twenty days before the actual operation. Take 30 lb. to 40 lb. finely ground wattle or mangrove bark to 20 gallons hot water; cover and stir frequently. Strain liquor into the barrel and add water to nearly fill it; add 2 quarts vinegar. Soak hides in this solution, stirring and moving them frequently.

Prepare a second lot of tanning solution in the same manner, and when the hides have coloured nicely, remove 5 gallons of the old tan and substitute 5 gallons of the new tan, and add another 2 quarts of vinegar. Repeat this operation every five days, omitting the vinegar. After thirty-five days, add 30 lb. to 40 lb. finely ground bark moistened with hot water; stirring well in order to cover the hides with bark. After six weeks' soaking with continual stirring, half-empty the barrel and fill up with finely ground bark. After two months the hide should be thoroughly tanned. Rinse and rub out all the tan water with a stiff brush and "sticker"; the latter is a piece of brass 6 inches by 4 inches let into a piece of wood along one edge, and is used in a similar manner to that of a scraper. When the hide is damp, but not wet, coat well with neatsfoot or cod oil, hang up and let dry slowly. When dry, damp again and apply a mixture of tallow and neatsfoot, in equal parts, boil and apply warm; dry the hides and sprinkle with sawdust to remove any oiliness.

Land Measurement.

5 L.H. (Torrens Creek)—

The plot, 172 yards by 120 yards, measures 4 acres 1 rood 2 perches and 9½ square yards.

Photographs for Reproduction.

J.G. (26-Mile Creek, Warra)—

The subjects are good, but the prints are not suitable for reproduction. We would much prefer to take our own prints off the negatives. Send them along, and, if desired, we shall return them to you after use. Photographs of suitable rural subjects are always welcome. Thanks.

Syphoning of Acid.

L.M. (Kingaroy)—

Your inquiry was referred to the Agricultural Chemist, Mr. J. C. Brünnich, who advises—

It is always difficult and even dangerous to start a syphon by suction, and it is far better to use pressure. Simply get a large rubber stopper to fit neck of jar tightly, make two holes, one to take the syphon tube, and the other fit with a small piece of glass or metal tubing, to which a bicycle pump can be attached; or even blowing by mouth will start the syphon.

Pig Fattening.

C.N.S. (Clifton)—

Your question, asking how much cracked wheat you will need to feed with butter-milk for fattening pigs was referred to the Agricultural Chemist, Mr. J. C. Brünnich, who advises:—

"A pig 100 lb. live weight requires for fattening a ration containing—

	Dry matter.	Proteins.	Carbohydrates.
	3.6 lb.	.5 lb.	3.2 lb.
1 gallon of butter-milk or skim milk supplies	1.0 lb.	.38 lb.	.92 lb.
4 lb. of crushed wheat ..	2.2 lb.	.30 lb.	1.30 lb.
	3.2 lb.	.68 lb.	2.22 lb.

So that the ration would be rather high in proteins and low in carbohydrates, and the ration should be supplemented by giving a few pounds of sweet potatoes, pumpkins, and mangels, &c."

Weeds for Identification—Tribulus terrestris, Caltrop; Polygonum aviculare.

F.B. (Goomeri)—

The weeds submitted were identified by the Government Botanist, Mr. C. T. White, F.L.S., as follows:—

(1) *Tribulus terrestris* Caltrop., a very bad weed. It is an annual plant and dies down after seeding. The only method of eradication is to cut close down to the ground at the main root before the seeds ripen. The seed-head takes the form of a nasty burr. In South Africa the weed has been proved to poison sheep and goats. It is only apparently poisonous in a fresh stage, feeding experiments with dried plants and even with quite recently cut ones giving negative results.

(2) *Polygonum aviculare.*—Knot weed or knot grass. A bad weed in cultivation, but contains no deleterious properties. Hoe cutting before the seed ripens is the only satisfactory method of eradication.

Pumpkin and Melon Seeds as Food for Stock and Poultry.

G.E. (Nambour)—

The Director of Agriculture, Mr. H. C. Quodling, replies—It is not known that these seeds are harmful to stock but should not be fed to fowls. Mr. J. C. Brünnich, Agricultural Chemist, advises as follows:—Pie melon have only a very low feeding value, and are poorer than pumpkins. Pie melons contain 94 per cent. of water and only ½ per cent. of protein, and 4 per cent. of carbohydrades. According to American reports the seeds contain much nutriment and should not be wasted. Pigs eat them readily; they act as a vermifuge, freeing the animals of worms and putting the digestive organs in good order. As the seeds are rich in protein and oil, eating in excess may cause digestive disturbance. The seeds of pumpkins are reported harmful to fowls, and melon seeds probably act likewise.

A Good Potato Return. Sugar Beet in the Granite Belt.

S.H.H. (Thulimba)—

(1) A return of 7 tons of sound potatoes from 8 cwt. of seed saved locally from last crop is a very satisfactory one, and very much above the average yield throughout Queensland, and even of Tasmania. Your return shows that, given proper attention, satisfactory and payable potato crops can be grown in your district.

(2) Sugar beet growing can only be profitably conducted where large areas are planted within reach of an up-to-date sugar-mill. There is very little likelihood of the industry being established in the Stanthorpe district. Sugar beet, no doubt, could be grown in your locality, and, probably, if selected varieties were planted and cultivation carried out on right lines, a high sugar content would be obtained; but, as already stated, unless the industry is carried out on a large scale, it is quite unlikely to become a commercial success. At the same time, should you wish to grow sugar beet for pigs or other farm stock, it would, no doubt, form a useful addition to animal rations.

Ophthalmia in Poultry.

H.F.H. (Bambaroo, *viâ* Townsville)—

The Poultry Instructor, Mr. J. Beard, advises—Besides the different eye inflammations, such as coryza, chicken pox, and diphtheria, there is another kind of ophthalmia due to minute worms which live under the nictating membrane. In this disease the eyes are watery, become inflamed, and at times the bird loses its sight. The worms are whitish or semi-transparent. The females either lay eggs in the eyes or are carried through the tearduct to the mouth and thence get into the intestines, where their bodies dissociate and the eggs are liberated, the latter are expelled in the stools and hatch on the ground. The larvæ of these worms live on wet ground for a certain time and get into the eyes of other birds when they take their usual dust bath. This disease is not widely spread, but assumes to serious character where it occurs. It can be easily kept in check by treating the birds and disinfecting the run with a strong solution of disinfectant. Any of the following treatments will be found beneficial:—

(1) Instil a few drops equal parts of tincture of Aloes and water three times daily; after three or four days the worms become absorbed.

(2) Instil a few drops one part Argyrol to ten parts water once a day for three or four days.

(3) Place your thumb on the base of the beak, then use pressure working your thumb gradually towards the corner of the eye; by so doing the worms will all be pressed out in one cluster. Wash clean and dry the eye and then instil a few drops of kerosene.

By following the foregoing instructions the worms should soon be eradicated.

Farm and Garden Notes for June.

FIELD.—Winter begins on the 24th of this month, and frosts will already have been experienced in some of the more exposed districts of the Southern coast and on the Darling Downs. Hence insect pests will, to a great extent, cease from troubling, and weeds will also be no serious drawback to cultivation. The month of June is considered by the most successful lucerne-growers to be the best time to lay down this crop, as any weeds which may spring up in the event of a dropping season will be so slow-growing that the young lucerne plants will not be choked by them.

The land should now be got ready for millets, sorghums, panicum, &c. Oats, barley, vetches, clover, tobacco, buckwheat, field carrots, and Swedes may now be sown. Some advocate the sowing of early maize and potatoes during this month, but obviously this can only apply to the more tropical parts of Queensland. The land may be got ready, but in the Southern districts and on the tableland neither maize nor potatoes should be planted before August, or at the earliest, in warm early districts, at the end of July. There is always almost a certainty of frosts, more or less severe, during these months. Arrowroot will be nearly ready for digging, but we would not advise taking up the bulbs until the frosts of July have occurred. Take up sweet potatoes, yams, and ginger. Should there be a heavy crop, and consequently a glut in the market, sweet potatoes may be kept by storing them in a cool place in dry sand, taking care that they are thoroughly ripe before digging. The ripeness may be known by the milky juice of a broken tuber remaining white when dry. Should the juice turn dark, the potato is unripe, and will rot or dry up and shrivel in the sand pit. Before pitting, spread the tubers out in a dry barn or in the open, if the weather be fine. In pitting them or storing them in hills, lay them on a thick layer of sand; then pour dry sand over them till all the crevices are filled and a layer of sand is formed above them; then put down another layer of tubers, and repeat the process until the hill is of the requisite size. The sand excludes the air, and the potatoes will keep right through the winter. Late wheat may still be sown, but it is too late for a field crop of onions. In tropical Queensland the bulk of the coffee crop should be off by the end of July. Yams may be unearthed. Cuttings of cinnamon and kola-nut tree may be made, the cuttings being planted under bell glasses. Collect divi-divi pods and tobacco leaves. English potatoes may be planted. The opium poppy will now be blooming and forming capsules. Gather tilseed (sesame), and plant out young tobacco plants if the weather be suitable. Sugar-cane cutting may be commenced. Keep the cultivator moving amongst the pineapples. Gather all ripe bananas. Fibre may be produced from the old stems.

Cotton crops are now fast approaching the final stages of harvesting. Growers are advised that all cotton in the Central District should be consigned to the Australian Cotton-growing Association, Rockhampton; whilst those in the Southern areas should consign their cotton to the Association at Whinstanes, Brisbane. All bags shuld be legibly branded with the owners' initials. In this matter the consignor is usually most careless, causing much delay and trouble in identifying parcels, which are frequently received minus the address labels.

KITCHEN GARDEN.—Cabbage, cauliflower, and lettuce may be planted out as they become large enough. Plant asparagus and rhubarb in well-prepared beds in rows. In planting rhubarb it will probably be found more profitable to buy the crowns than to grow them from seed, and the same remark applies to asparagus.

Sow cabbage, red cabbage, peas, lettuce, broad beans, carrots, radish, turnip, beet, leeks, and herbs of various kinds, such as sage, thyme, mint, &c. Eschalots, if ready, may be transplanted; also horse radish can be set out now.

The earlier sowings of all root crops should now be ready to thin out, if this has not been already attended to.

Keep down the weeds among the growing crops by a free use of the hoe and cultivator.

The weather is generally dry at this time of the year, so the more thorough the cultivation the better for the crops.

Land for early potatoes should now be got ready by well digging or ploughing.

Tomatoes intended to be planted out when the weather gets warmer may be sown towards the end of the month in a frame where the young plants will be protected from frost.

FLOWER GARDEN.—No time is now to be lost, for many kinds of plants need to be planted out early to have the opportunity of rooting and gathering strength in the cool, moist spring time to prepare them for the trial of heat they must endure later on. Do not put your labour on poor soil. Raise only the best varieties of plants in the garden; it costs no more to raise good varieties than poor ones. Prune closely all the hybrid perpetual roses; and tie up, without pruning, to trellis or stakes the climbing and tea-scented varieties, if not already done. These and other shrubs may still be planted. See where a new tree or shrub can be planted; get these in position; then they will give you abundance of spring bloom. Renovate and make lawns, and plant all kinds of edging. Finish all pruning. Divide the roots of chrysanthemums, perennial phlox, and all other hardy clumps; and cuttings of all the Summer bedding plants may be propagated.

Sow first lot, in small quantities, of hardy and half-hardy annuals, biennials, and perennials, some of which are better raised in boxes and transplanted into the open ground, but many of this class can, however, be successfully raised in the open if the weather is favourable. Antirrhinum, carnation, picotees, dianthus, hollyhock, larkspur, pansy, petunia, *Phlox Drummondi*, stocks, wallflower, and zinnias, &c., may be sown either in boxes or open beds; mignonette is best sown where it is intended to remain. Dahlia roots may be taken up and placed in a shady situation out of doors. Plant bulbs such as anemones, ranunculus, freesias, snowflakes, ixias, watsonias, iris, narcissus, daffodils, &c. Tulips will not suit the Queensland climate.

To grow these plants successfully, it is only necessary to thoroughly dig the ground over to a depth of not less than 12 in., and incorporate with it a good dressing of well-decayed manure, which is most effectively done by a second digging; the surface should then be raked over smoothly, so as to remove all stones and clods, thus reducing it to a fine tilth. The seed can then be sown in lines or patches as desired, the greatest care being taken not to cover deeply; a covering of not more than three times the diameter of larger seeds, and a light sprinkling of fine soil over small seeds, being all that is necessary. A slight mulching of well-decayed manure and a watering with a fine-rosed can will complete the operation. If the weather prove favourable, the young seedlings will usually make their appearance in a week or ten days; thin out so as to leave each plant (if in the border) at least 4 to 6 in. apart.

Orchard Notes for June.

THE COAST DISTRICTS.

The remarks that have appeared in these notes for the past two months apply in a great measure to June as well, as the advice that has been given regarding the handling, grading, packing, and marketing of the citrus crop still holds good. As the weather gets cooler the losses due to the ravages of fruit flies decrease, as these insects cannot stand cold weather, and consequently there is only an odd one about. The absence of flies does not, however, permit of any relaxation in the care that must be taken with the fruit, even though there may be many less injured fruit, owing to the absence of fruit-fly puncture, as there is always a percentage of damaged fruit which is liable to speck, which must be picked out from all consignments before they are sent to the Southern States, if a satisfactory return is to be expected. If the weather is dry, citrus orchards must be kept in a good state of tilth, otherwise the trees may get a setback. Old worn-out trees can be dug out and burnt; be sure, however, to see that they *are* worn out, as many an old and apparently useless tree can be brought round and made to bear good crops, provided the trunk and main roots are still sound, even though the top of the tree is more or less dead. The whole of the top of the tree should be cut off and only the trunk and such sound main limbs left as are required to make a new head. The earth should be taken away from around the collar of the tree, and the main roots exposed, any dead roots being cut away and removed. The whole of the tree above ground and the main roots should then be dressed with a strong lime sulphur wash, or Bordeaux paste. The main roots should be exposed for some time, not opened up and filled in at once. Young orchards can be set out now, provided the ground is in good order. Don't make the mistake of planting the trees in improperly prepared land—it is far better to wait till the land is ready, and you can rest assured it will pay to do so in the long run.

When planting, see that the centre of the hole is slightly higher than the sides, so that the roots, when spread out, will have a downward, not an upward tendency; set the tree at as nearly as possible the same depth as it was when growing in the nursery, cut off all broken or bruised roots, and spread those that remain evenly, and cover them fine top soil. If the land is dry, the tree should then be given a good watering, and when the water has soaked in, the hole can be filled up with dry soil. This is far better than watering the tree after the soil has been placed round it and the hole filled up. Custard apples will be ripening more slowly as the nights get colder, and if the weather becomes unduly cold, or if immature fruit is sent South, the fruit is apt to turn black and be of no value. This can easily be overcome by subjecting the fruit to artificial heat, as is done in the case of bananas during the cooler part of the year, when it will ripen up properly and develop its flavour. Grade custard apples carefully, and pack in cases holding a single layer of fruit only for the Southern markets.

Pineapples, when at all likely to be injured by frost, should be protected by a thin covering of bush hay, or similar material. The plantation should be kept well worked and free from weeds, and slow-acting manure, such as bone dust or island phosphates, can be applied now. Lime can also be applied when necessary. The fruit takes longer to mature at this time of the year, consequently it can be allowed to remain on the plant till partly coloured before gathering for the Southern markets, or can be fully coloured for local use.

Banana plantations must be kept worked and free from weeds, especially if the weather is dry, as a severe check to the plants now means small fruit later on. Bananas should be allowed to become full before the fruit is cut, as they will carry all right at this time of the year; in fact, there is more danger of their being injured by cold when passing through New England by train than there is of their ripening up too quickly.

Bear in mind the advice given with regard to the handling, grading, and packing of the fruit. It will pay you to do so. Land intended for planting with bananas or pineapples during the Spring should be got ready now.

Strawberries require constant attention, and unless there is a regular and abundant rainfall they should be watered regularly. In fact, in normal seasons, an adequate supply of water is essential, as the plants soon suffer from dry weather, or strong, cold westerly winds. Where not already done, vineyards should be cleaned up ready for pruning—it is, however, too early to prune or to plant out new vineyards.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

All kinds of deciduous fruit trees are now ready for pruning, and this is the principal work of the month in the orchards of the Granite Belt Area. Don't be frightened to thin out young trees properly, or to cut back hard—many good trees are ruined by insufficient or bad pruning during the first three years. If you do not know how to prune, do not touch your trees, but get practical advice and instructions from one or other of the Departmental officers stationed in the district. In old orchards do not have too much bearing wood; cut out severely, especially in the case of peaches, or you are likely to get a quantity of small unsaleable fruit. There are far too many useless and unprofitable fruit trees in the Granite Belt Area which are nothing more or less than breeding-grounds for pests, such as fruit fly, and are a menace to the district. Now is the time to get rid of them. If such trees are old and worn out, take them out and burn them, but if they are still vigorous, cut all the tops off and work them over with better varieties in the coming season—apples by grafting in spring and peaches and other stone fruits by budding on to young growth in summer. Planting can start now, where the land is ready and the trees are to hand, as early planted trees become well established before spring and thus get a good start. Be very careful what you plant. Stick to varieties of proved merit, and few at that, and give so-called novelties and inferior sorts a wide berth. Take the advice of old growers, and do not waste time experimenting with sorts that have probably been tested in the district, and turned down years ago. When land is intended for planting this season, see that it is well prepared and well sweetened before the trees are put in, as young trees seldom make a good start when planted in sour and badly prepared land.

Slowly acting manure—such as bonedust, meatworks manure, or island phosphates—can be applied now, as they are not liable to be washed out of the soil, and they will be available for the use of the trees when it starts growth in spring. Lime can also be applied where required. Badly-drained land should be attended to, as no fruit trees will thrive with stagnant water lying round their roots.

On the Downs and Tableland all kinds of fruit trees can be pruned now, and vines can be pruned also in any district where there is no danger from late frosts, and where this can be done the prunings should be gathered and burnt and the vineyard ploughed up and well worked to reduce the soil to a good state of tilth, so that should rain come it will absorb all that falls and the moisture can be kept in the soil by cultivation subsequently.

Citrus fruits will be at their best in the Western districts. The trees should be watered if they show signs of distress, otherwise all that is necessary is to keep the surface of the land well worked. All main-crop lemons should be cut by this time, as if allowed to remain longer on the tree they only become overgrown and are more suitable for the manufacture of peel, whereas if cut and cased now they will keep in good order so that they can be used during the hot weather.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1923.	APRIL.		MAY.		JUNE.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·3	5·49	6·20	5·19	6·37	5·2
2	6·4	5·48	6·20	5·18	6·37	5·2
3	6·4	5·47	6·21	5·17	6·38	5·2
4	6·5	5·46	6·21	5·16	6·38	5·2
5	6·5	5·45	6·22	5·15	6·39	5·1
6	6·6	5·44	5·22	5·14	6·39	5·1
7	6·6	5·43	6·23	5·13	6·40	5·1
8	6·7	5·42	6·23	5·13	6·40	5·1
9	6·7	5·41	6·24	5·12	6·41	5·1
10	6·8	5·40	6·24	5·12	6·41	5·1
11	6·8	5·39	6·25	5·11	6·41	5·1
12	6·9	5·37	6·26	5·11	6·42	5·1
13	6·9	5·36	6·26	5·10	6·42	5·1
14	6·10	5·35	6·27	5·10	6·42	5·1
15	6·10	5·34	6·27	5·9	6·42	5·2
16	6·11	5·32	6·28	5·8	6·43	5·2
17	6·11	5·31	6·29	5·8	6·43	5·2
18	6·12	5·30	6·29	5·7	6·43	5·2
19	6·12	5·29	6·30	5·7	6·43	5·2
20	6·13	5·28	5·30	5·6	6·44	5·2
21	6·14	5·27	6·31	5·6	6·44	5·2
22	6·14	5·26	6·31	5·5	6·44	5·2
23	6·15	5·25	6·32	5·5	6·44	5·3
24	6·15	5·24	6·32	5·4	6·44	5·3
25	6·16	5·23	6·33	5·4	6·45	5·3
26	6·17	5·22	6·34	5·4	6·45	5·4
27	6·17	5·21	6·34	5·3	6·45	5·4
28	6·18	5·21	6 35	5·3	6·45	5·4
29	6·18	5·20	6·35	5·3	6·45	5·5
30	6·19	5·20	6·36	5·3	6·45	5·5
31	...	...	6 36	5·2	...	...

PHASES OF THE MOON, OCCULTATIONS, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania when "Summer" Time is not used.

1 April	○	Full Moon	11 10 p.m.
8 „	☽	Last Quarter	3 22 p.m.
16 „	●	New Moon	4 28 p.m.
24 „	☾	First Quarter	3 20 p.m.

Perigee on 2nd at 7.24 a.m., and 30th at 6.24 p.m.

The Full Moon will be apparently very near to Saturn and Spica on the nights of April 1 and 2.

On the 19th the Moon in Crescent form will pass Mars soon after Sunset.

On Sunday, 29th April, an interesting Occultation of Saturn will take place about 5 p.m., Saturn reappearing about 6 p.m. Saturn will also be Occulted on 26th May, about Midnight.

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1 May	○	Full Moon	7 30 a.m.
8 „	☽	Last Quarter	4 18 a.m.
16 „	●	New Moon	8 38 a.m.
24 „	☾	First Quarter	12 25 p.m.
30 „	○	Full Moon	3 7 p.m.

Apogee on the 13th, at 2.48 p.m.
Perigee on the 29th, at 1.48 a.m.

Jupiter will be in opposition to the Sun at Midnight on the 5th, when it will be nearly overhead.

Mercury being at its greatest eastern elongation about the 5th should be visible between the Pleiades and Hyades soon after Sunset.

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6 June	☽	Last Quarter	7 19 p.m.
14 „	●	New Moon	10 42 p.m
22 „	☾	First Quarter	6 46 a m.
28 „	○	Full Moon	11 4 p.m.

Apogee on the 10th, at 4.30 a.m.
Perigee on the 25th, at 11.30 p.m.

About an hour before Sunrise on the 12th the Moon in Crescent form and the beautiful planet Venus will afford a fine celestial picture somewhat low down in the East with the Pleiades north of them.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter, and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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